City: MONTICELLO
MONTICELLO MILL TAILINGS (USDOE)

Site Information:

Site Name: MONTICELLO MILL TAILINGS (USDOE)
Address: MONTICELLO, UT

EPA ID: UT3890090035
EPA Region: 08

Record of Decision (ROD):

ROD Date: 08/22/1990
Operable Unit: 01, 02
ROD ID: EPA/ROD/R08-90/034

Media: SOIL DEBRIS

Contaminant: METALS, ARSENIC, CHROMIUM, LEAD, RADIOACTIVE MATERIALS, RADIUM-226

Abstract: THE 300-ACRE MONTICELLO MILL TAILINGS SITE IS COMPRISED OF A 78-ACRE INACTIVE URANIUM AND VANADIUM MILLING OPERATION AND AFFECTED PERIPHERAL PROPERTIES IN MONTICELLO, SAN JUAN COUNTY, UTAH. SURROUNDING LAND USE IS RURAL RESIDENTIAL AND AGRICULTURAL. THE SITE OVERLIES A SHALLOW ALLUVIAL AQUIFER, AND PART OF THE SITE LIES WITHIN THE FLOODPLAIN OF MONTEZUMA CREEK. APPROXIMATELY 18-ACRES OF WETLANDS ADJACENT TO MONTEZUMA CREEK ALSO HAVE BEEN CONTAMINATED BY TAILINGS. IN 1940, THE SITE WAS OPERATED AS A VANADIUM ORE-BUYING STATION. MILLING OF ORE BEGAN IN 1942, AND A VANADIUM/URANIUM SLUDGE PRODUCT WAS PRODUCED ONSITE FROM 1943 TO 1944. ONSITE URANIUM MILLING PROCESSES BEGAN IN THE MID-FORTIES AND CONTINUED UNTIL 1959. MILL TAILINGS FROM THESE OPERATIONS WERE DISPOSED OF IN FOUR ONSITE TAILINGS PILES THAT ARE WITHIN THE FLOODPLAIN OF THE MONTEZUMA CREEK. THE MILL WAS PERMANENTLY CLOSED IN 1960, AND THE TAILINGS PILES WERE COVERED AND VEGETATED. FROM 1964 TO 1965, THE ENTIRE PLANT WAS DISMANTLED AND

FOUNDATIONS WERE PARTIALLY BURIED ONSITE ALONG WITH CONTAMINATED MATERIAL. ONSITE AND OFFSITE SOIL CONTAMINATION IS THE RESULT OF WIND SURFACE WATER EROSION OF THE CONTAMINATED TAILINGS PILES WITH SUBSEQUENT DEPOSITION ELSEWHERE. IN 1972, 15,000 CUBIC YARDS OF CONTAMINATED SOIL WERE EXCAVATED AND DISPOSED OF ON THE ONSITE TAILINGS PILES. SITE INVESTIGATIONS FROM 1989 TO 1990 IDENTIFIED THE PRESENCE OF ONSITE AND OFFSITE RADIOACTIVELY-CONTAMINATED SOIL AND GROUND WATER, AND ELEVATED CONCENTRATIONS OF METALS WITHIN THE TAILINGS PILES. THIS RECORD OF DECISION (ROD) ADDRESSES REMEDIATION OF TWO OPERABLE UNITS (OU); THE 78-ACRE MILLSITE AREA, AND THE 240-ACRES OF PERIPHERAL PROPERTIES (OU1 AND OU2). A SUBSEQUENT ROD WILL ADDRESS REMEDIATION OF GROUND WATER AND SURFACE WATER ONCE THE SOURCE AREAS HAVE BEEN REMOVED. THE PRIMARY CONTAMINANTS OF CONCERN AFFECTING THE SOIL AND DEBRIS ARE METALS INCLUDING ARSENIC, CHROMIUM, AND LEAD; AND RADIOACTIVE MATERIALS INCLUDING RADIUM-266 AND RADON.

THE SELECTED REMEDIAL ACTION FOR THIS SITE INCLUDES DEWATERING AND EXCAVATING 1.5 MILLION CUBIC YARDS OF TAILINGS, CONTAMINATED SOIL, AND PROCESS-RELATED MATERIAL FROM THE CONTAMINATED TAILINGS PILES; CONSOLIDATING THESE MATERIALS IN AN ONSITE REPOSITORY THAT WILL BE BUILT ONE MILE SOUTH OF THE EXISTING MILLSITE; DIVERTING MONTEZUMA CREEK TO ALLOW FOR THE RELOCATION OF MILL TAILINGS AND CONTAMINATED FLOODPLAIN SOIL, EXCAVATING 300,000 CUBIC YARDS OF CONTAMINATED SOIL FROM THE PERIPHERAL PROPERTIES, FOLLOWED BY EVENTUAL CONSOLIDATION OF THE SOIL WITHIN THE REPOSITORY; BACKFILLING EXCAVATED AREAS WITH CLEAN FILL; TREATING SURFACE RUNOFF AND CONSTRUCTION/DEWATERING WATER COLLECTED DURING CONSTRUCTION USING EVAPORATION PONDS, REVERSE OSMOSIS, OR ANOTHER TECHNOLOGY AND DISCHARGING THE TREATED WATER TO MONTEZUMA CREEK; DISPOSING OF ANY TREATMENT RESIDUALS WITHIN THE REPOSITORY OR AT AN OFFSITE FACILITY; COVERING THE REPOSITORY WITH A CLAY AND MULTI-MEDIA CAP; REVEGETATING THE MILLSITE AND

REPOSITORY SITE; MONITORING AIR, GROUND WATER AND SURFACE WATER; AND IMPLEMENTING INSTITUTIONAL CONTROLS AND SITE ACCESS RESTRICTIONS. THE ESTIMATED CAPITAL COST FOR THIS REMEDIAL ACTION RANGES FROM $64,787,500 TO $70,600,000 (BASED ON THE COST OF ENGINEERING CONTROLS), WHICH INCLUDES AN ANNUAL O&M COST OF $40,846 FOR 24 YEARS.

PERFORMANCE STANDARDS OR GOALS; FEDERAL STANDARDS FOR RADIUM-226 ARE 5 PCI/G ABOVE BACKGROUND IN THE SURFACE 15 CENTIMETERS OF SOIL, AND 15 PCI/G ABOVE BACKGROUND LEVEL FOR RADIUM-226 IN THE DEEPER 15 CENTIMETERS - THICK LAYER. BECAUSE THE BACKGROUND LEVEL AT THE SITE IS RADIUM-226 1.0 PLUS 0.4 PCI/G, EXCAVATION LEVELS WERE SET AT 6 PCI/G FOR SURFICIAL SOIL, AND 16 PCI/G FOR SOIL GREATER THAN 15 CENTIMETERS DEEP. THE FEDERAL STANDARD OF 20 PCI/M2/SEC FOR RADON EMISSIONS WILL ALSO BE MET.INSTITUTIONAL CONTROLS;
INSTITUTIONAL CONTROLS WILL BE IMPLEMENTED AT THE SITE.

Remedy: THE REMEDY ADDRESSES THE PRINCIPAL THREATS AT THE SITE, WHICH ARE ASSOCIATED WITH RADON EMISSIONS AND DIRECT EXPOSURE TO GAMMA RADIATION FROM THE EXISTING MILL TAILINGS PILES.

THE MAJOR COMPONENTS OF THE SELECTED REMEDY FOR OPERABLE UNIT I INCLUDE;
* REMOVAL OF APPROXIMATELY 1.5 MILLION CUBIC YARDS OF TAILINGS, ORE, AND PROCESS-RELATED MATERIAL (BY-PRODUCT MATERIAL, CONTAMINATED BUILDING MATERIALS, AND MILL EQUIPMENT) FROM THEIR PRESENT LOCATION WHERE THEY ARE WITHIN THE FLOODPLAIN OF MONTEZUMA CREEK OR ARE IN CONTACT WITH THE GROUND WATER TO A REPOSITORY ONE MILE SOUTH OF THE PRESENT MILL TAILINGS SITE. THE REPOSITORY WOULD BE DESIGNED TO MEET REQUIREMENTS OF THE URANIUM MILL TAILINGS RADIATION CONTROL ACT OF 1978 AND THE URANIUM MILL TAILINGS REMEDIAL ACTION PROGRAM TECHNICAL STANDARDS. THIS REMEDY HAS BEEN DETERMINED TO BE AN ON-SITE REMEDY PURSUANT TO THE NATIONAL CONTINGENCY PLAN.

* CAPPING THE REPOSITORY TO PROTECT THE GROUND WATER, ISOLATE THE WASTE FROM THE ENVIRONMENT, AND TO CONTROL THE ESCAPE OF RADON GAS;
* CONSTRUCTION OF SURFACE-WATER CONTROLS NECESSARY DURING REMEDIAL ACTION CONSTRUCTION ACTIVITIES AND FOR THE REPOSITORY;
* TREATMENT OF CONTAMINATED RUNOFF WATER AND CONSTRUCTION/DEWATERING WATER COLLECTED DURING CONSTRUCTION ACTIVITIES IN ACCORDANCE WITH APPLICABLE STANDARDS PRIOR TO RELEASE TO THE ENVIRONMENT, WITH DISPOSAL OF RESIDUALS IN THE REPOSITORY OR ANOTHER LICENSED REPOSITORY. TREATMENT MAY BE PERFORMED BY EVAPORATION, REVERSE OSMOSIS, OR ANOTHER APPROPRIATE TECHNOLOGY AND WILL BE DETERMINED DURING THE DESIGN STAGE;
* REVEGETATION OF THE MILLSITE AND REPOSITORY SITE;
* LONG-TERM SURVEILLANCE AND ENVIRONMENTAL MONITORING TO ENSURE THE EFFECTIVENESS OF THE REMEDIAL ACTION AND COMPLIANCE WITH GROUND WATER AND SURFACE-WATER STANDARDS;
* LAND ACQUISITION AND ACCESS CONTROL AS NECESSARY.

OPERABLE UNIT II - PERIPHERAL PROPERTIES. REMEDIATION OF THIS OPERABLE UNIT IS THE SECOND OF THE THREE FINAL ACTIONS PLANNED FOR THE SITE. REMEDIAL ACTION AT OPERABLE UNIT II ADDRESSES THE REMOVAL OF RADIOACTIVELY CONTAMINATED SOILS AND PROCESSING BY-PRODUCT MATERIALS LOCATED ON PERIPHERAL PROPERTIES. THE REMEDY WOULD REDUCE RADIATION EXPOSURE TO THE PUBLIC BY EITHER REMOVING CONTAMINATED MATERIALS BY CONVENTIONAL CONSTRUCTION TECHNIQUES OR ENVIRONMENTALLY SENSITIVE CONSTRUCTION TECHNIQUES, OR BY PROPOSING THE USE OF SUPPLEMENTAL STANDARDS. AS ALLOWED UNDER THE PRINCIPAL RELEVANT AND APPROPRIATE REQUIREMENT, SUPPLEMENTAL STANDARDS ALLOWS LEAVING SOME OR ALL OF THE CONTAMINATION IN PLACE WHERE REMOVAL WOULD CAUSE UNDUE ENVIRONMENTAL DAMAGE. MATERIALS REMOVED FROM THE PROPERTIES WOULD BE PLACED ON THE EXISTING TAILINGS PILE FOR FINAL DISPOSAL WITH TAILINGS FROM OPERABLE UNIT I. IN AREAS WHERE SUPPLEMENTAL CLEAN UP STANDARDS

UNDER TITLE 40 CODE OF FEDERAL REGULATIONS, PART 192.22 COULD APPLY (THE CEMETERY AND DENSELY VEGETATED HILLSIDES SOUTH OF MONTEZUMA CREEK), INSTITUTIONAL CONTROLS MAY BE USED TO RESTRICT ACCESS AND CONTROL THE USE OF THE LAND TO PREVENT FUTURE EXPOSURE.

THE MAJOR COMPONENTS OF THE SELECTED REMEDY INCLUDE;
* REMOVAL OF AN ESTIMATED 300,000 CUBIC YARDS OF TAILINGS FROM PERIPHERAL PROPERTIES AND EVENTUAL DISPOSAL IN THE SAME REPOSITORY AS DESCRIBED FOR OPERABLE UNIT I;
* VEGETATION AFTER REMOVAL OF TAILINGS;
* THE USE OF INSTITUTIONAL CONTROLS, IF NECESSARY.
OPERABLE UNITS I AND II ARE SCHEDULED TO BE COMPLETED OVER A 5-YEAR PERIOD. REVIEWS OF THE SELECTED REMEDY ARE SCHEDULED UNDER THE COMPREHENSIVE ENVIRONMENTAL RESPONSE, COMPENSATION, AND LIABILITY ACT AT FIVE-YEAR INTERVALS, COMMENCING WITH THE INITIATION OF REMEDIAL ACTION.

Text: Full-text ROD document follows on next page.

Text:

* REMOVAL OF APPROXIMATELY 1.5 MILLION CUBIC YARDS OF TAILINGS, ORE, AND PROCESS-RELATED MATERIAL (BY-PRODUCT MATERIAL, CONTAMINATED BUILDING MATERIALS, AND MILL EQUIPMENT) FROM THEIR PRESENT LOCATION WHERE THEY ARE WITHIN THE FLOODPLAIN OF MONTEZUMA CREEK OR ARE IN CONTACT WITH THE GROUND WATER TO A REPOSITORY ONE MILE SOUTH OF THE PRESENT MILL TAILINGS SITE. THE REPOSITORY WOULD BE DESIGNED TO MEET REQUIREMENTS OF THE URANIUM MILL TAILINGS RADIATION CONTROL ACT OF 1978 AND THE URANIUM MILL TAILINGS REMEDIAL ACTION PROGRAM TECHNICAL STANDARDS. THESE STANDARDS REQUIRE THE REPOSITORY BE EFFECTIVE FOR UP TO 1,000 YEARS TO THE EXTENT REASONABLY ACHIEVABLE, AND THAT THE ESCAPE OF RADON GAS BE CONTROLLED TO WITHIN ACCEPTABLE LIMITS. THIS REMEDY HAS BEEN DETERMINED TO BE AN ON-SITE REMEDY PURSUANT TO THE NATIONAL CONTINGENCY PLAN.

* CAPPING THE REPOSITORY TO PROTECT THE GROUND WATER, ISOLATE THE WASTE FROM THE ENVIRONMENT, AND TO CONTROL THE ESCAPE OF RADON GAS;

* CONSTRUCTION OF SURFACE-WATER CONTROLS NECESSARY DURING REMEDIAL ACTION CONSTRUCTION ACTIVITIES AND FOR THE REPOSITORY;

* TREATMENT OF CONTAMINATED RUNOFF WATER AND CONSTRUCTION/DEWATERING WATER COLLECTED DURING CONSTRUCTION ACTIVITIES IN ACCORDANCE WITH APPLICABLE STANDARDS PRIOR TO RELEASE TO THE ENVIRONMENT, WITH DISPOSAL OF RESIDUALS IN THE REPOSITORY OR ANOTHER LICENSED REPOSITORY. TREATMENT MAY BE PERFORMED BY EVAPORATION, REVERSE OSMOSIS, OR ANOTHER APPROPRIATE TECHNOLOGY AND WILL BE DETERMINED DURING THE DESIGN STAGE;

* REVEGETATION OF THE MILLSITE AND REPOSITORY SITE;

* LONG-TERM SURVEILLANCE AND ENVIRONMENTAL MONITORING TO ENSURE THE EFFECTIVENESS OF THE REMEDIAL ACTION AND COMPLIANCE WITH GROUND WATER AND SURFACE-WATER STANDARDS;

* LAND ACQUISITION AND ACCESS CONTROL AS NECESSARY.

OPERABLE UNIT II - PERIPHERAL PROPERTIES

REMEDIATION OF THIS OPERABLE UNIT IS THE SECOND OF THE THREE FINAL ACTIONS PLANNED FOR THE SITE. REMEDIAL ACTION AT OPERABLE UNIT II

ADDRESSES THE REMOVAL OF RADIOACTIVELY CONTAMINATED SOILS AND PROCESSING BY-PRODUCT MATERIALS LOCATED ON PERIPHERAL PROPERTIES. THE REMEDY WOULD REDUCE RADIATION EXPOSURE TO THE PUBLIC BY EITHER REMOVING CONTAMINATED MATERIALS BY CONVENTIONAL CONSTRUCTION TECHNIQUES OR ENVIRONMENTALLY SENSITIVE CONSTRUCTION TECHNIQUES, OR BY PROPOSING THE USE OF SUPPLEMENTAL STANDARDS. AS ALLOWED UNDER THE PRINCIPAL RELEVANT AND APPROPRIATE REQUIREMENT, SUPPLEMENTAL STANDARDS ALLOWS LEAVING SOME OR ALL OF THE CONTAMINATION IN PLACE WHERE REMOVAL WOULD CAUSE UNDUE ENVIRONMENTAL DAMAGE. MATERIALS REMOVED FROM THE PROPERTIES WOULD BE PLACED ON THE EXISTING TAILINGS PILE FOR FINAL DISPOSAL WITH TAILINGS FROM OPERABLE UNIT I. IN AREAS WHERE SUPPLEMENTAL CLEAN UP STANDARDS UNDER TITLE 40 CODE OF FEDERAL REGULATIONS, PART 192.22 COULD APPLY (THE CEMETERY AND DENSELY VEGETATED HILLSIDES SOUTH OF MONTEZUMA CREEK), INSTITUTIONAL CONTROLS MAY BE USED TO RESTRICT ACCESS AND CONTROL THE USE OF THE LAND TO PREVENT FUTURE EXPOSURE. THE MAJOR COMPONENTS OF THE SELECTED REMEDY INCLUDE:

* REMOVAL OF AN ESTIMATED 300,000 CUBIC YARDS OF TAILINGS FROM PERIPHERAL PROPERTIES AND EVENTUAL DISPOSAL IN THE SAME REPOSITORY AS DESCRIBED FOR OPERABLE UNIT I;

* VEGETATION AFTER REMOVAL OF TAILINGS;

* THE USE OF INSTITUTIONAL CONTROLS, IF NECESSARY.

OPERABLE UNITS I AND II ARE SCHEDULED TO BE COMPLETED OVER A 5-YEAR PERIOD. REVIEWS OF THE SELECTED REMEDY ARE SCHEDULED UNDER THE COMPREHENSIVE ENVIRONMENTAL RESPONSE, COMPENSATION, AND LIABILITY ACT AT FIVE-YEAR INTERVALS, COMMENCING WITH THE INITIATION OF REMEDIAL ACTION.

OPERABLE UNIT III - GROUND WATER AND SURFACE WATER

REMEDIAL ACTION OF OPERABLE UNIT III ADDRESSES CLEAN UP OF GROUND WATER AND SURFACE-WATER CONTAMINATION. THE UPPER AND LOWER MONTEZUMA CREEK PERIPHERAL PROPERTIES WILL ALSO BE REMEDIATED IN THIS OPERABLE UNIT. DURING THE REMEDIAL ACTION OF OPERABLE UNITS I AND II, THE CHARACTERISTICS OF THE GROUND WATER IN THE ALLUVIAL AQUIFER AND THE SURFACE WATER IN MONTEZUMA CREEK (OPERABLE UNIT III) WILL BE ALTERED. REMEDIAL ACTION CONSTRUCTION ACTIVITIES WILL CAUSE THE FOLLOWING CHANGES:

1. SURFACE WATER, A PRINCIPAL SOURCE OF GROUND WATER, WILL BE DIVERTED AROUND THE SITE. THIS WILL CAUSE UNKNOWN EFFECTS IN THE ATTENUATION AND CHEMICAL PROPERTIES OF SOILS BELOW THE SITE.

2. THE SOILS IN THE ALLUVIAL AQUIFER CONTAMINATED BY MILL TAILINGS OR LEACHATE WILL BE EXCAVATED TO THE STANDARDS IN 40 CFR 192 DURING THE REMEDIAL ACTIVITIES PROPOSED FOR OPERABLE UNIT I. THE CONTAMINATED PORE WATER RETAINED IN

THE EXCAVATED SOILS WILL BE REMOVED WITH THE SOILS.

3. DURING CONSTRUCTION, PORTIONS OF THE SITE MUST BE DEWATERED TO FACILITATE REMOVAL ACTIVITIES THUS REMOVING A LARGE AMOUNT OF WATER FROM THE ALLUVIAL AQUIFER. ALL WATER FROM DEWATERING OF TAILINGS AND SOIL AND FROM CONSTRUCTION ACTIVITIES WILL BE TREATED AND RELEASED TO THE ENVIRONMENT IN COMPLIANCE WITH THE APPLICABLE REQUIREMENTS.

THE RESULTS OF THESE CHANGES WILL HAVE AN UNKNOWN EFFECT ON THE CHARACTERISTICS OF THE AQUIFER.

THROUGHOUT REMEDIATION OF OPERABLE UNITS I AND II, A GROUND WATER AND SURFACE-WATER MONITORING PROGRAM OF THE ALLUVIAL AND BURRO CANYON AQUIFERS WILL BE CONDUCTED UPGRADIENT FROM, DOWNGRADIENT FROM, AND ON THE MILLSITE. THIS MONITORING PROGRAM WILL CONTINUE FOR THREE YEARS AFTER REMOVAL OF THE CONTAMINATED MATERIAL. AS MONITORING CONTINUES DURING THE THREE YEAR PERIOD, THE US DEPARTMENT OF ENERGY, THE US ENVIRONMENTAL PROTECTION AGENCY, AND THE STATE OF UTAH WILL PERIODICALLY

REVIEW THE RESULTS OF THE MONITORING PROGRAM AND DETERMINE WHAT ADDITIONAL STEPS, IF ANY, WILL BE REQUIRED TO COMPLETE AQUIFER RESTORATION. WHEN SUFFICIENT DATA HAVE BEEN GATHERED THROUGH A FOCUSED REMEDIAL INVESTIGATION/FEASIBILITY STUDY TO WARRANT A FINAL DECISION FOR GROUND WATER AND SURFACE-WATER RESTORATION, A RECORD OF DECISION WILL BE PRODUCED FOR OPERABLE UNIT III.

INSTITUTIONAL CONTROLS, INCLUDING BUYING OR LEASING OF LAND AND WATER RIGHTS, WILL BE IMPLEMENTED FOR MONTEZUMA CREEK AND THE ALLUVIAL AQUIFER PRIOR TO REMEDIAL ACTION CONSTRUCTION ON OPERABLE UNITS I AND II. THESE CONTROLS WILL BE MAINTAINED UNTIL SUCH TIME AS A DECISION IS MADE REGARDING SURFACE-WATER AND GROUND WATER REMEDIATION.

#DSD
DECLARATION OF STATUTORY DETERMINATIONS

THE SELECTED REMEDY IS PROTECTIVE OF HUMAN HEALTH AND THE ENVIRONMENT, COMPLIES WITH FEDERAL AND STATE OF UTAH REQUIREMENTS THAT ARE LEGALLY APPLICABLE OR RELEVANT AND APPROPRIATE TO THE REMEDIAL ACTION, AND IS COST-EFFECTIVE. THIS REMEDY UTILIZES PERMANENT SOLUTIONS AND ALTERNATIVE TREATMENT (OR RESOURCE RECOVERY) TECHNOLOGIES TO THE MAXIMUM EXTENT PRACTICABLE FOR THIS SITE. THIS REMEDY DOES NOT SATISFY THE STATUTORY PREFERENCE FOR TREATMENT AS A PRINCIPAL ELEMENT FOR SEVERAL REASONS. DUE TO THE LARGE VOLUME OF CONTAMINATED MATERIALS, TREATMENT IS NOT PRACTICABLE. FURTHER, NONE OF THE PROVEN TREATMENT TECHNOLOGIES AVAILABLE FOR RADIOLOGICAL CONTAMINANTS REDUCES THE TOTAL VOLUME OR TOXICITY OF THESE CONTAMINANTS, NOR DO THEY IRREVERSIBLY REDUCE CONTAMINANT MOBILITY. TECHNOLOGIES THAT COULD REDUCE THE TOTAL VOLUME OF CONTAMINATED SOIL PRODUCE RESIDUALS THAT WOULD PRESENT A THREAT TO

HUMAN HEALTH AND THE ENVIRONMENT.

BECAUSE THIS REMEDY WILL RESULT IN HAZARDOUS SUBSTANCES REMAINING ON SITE ABOVE HEALTH-BASED LEVELS, A REVIEW WILL BE CONDUCTED WITHIN FIVE YEARS AFTER COMMENCEMENT OF REMEDIAL ACTION TO ENSURE THAT THE REMEDY CONTINUES TO PROVIDE ADEQUATE PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT.

REGIONAL ADMINISTRATOR (REGION VIII) DATE: 08/22/90
US ENVIRONMENTAL PROTECTION AGENCY

US DEPARTMENT OF ENERGY DATE: 09/20/90
IDAHO OPERATIONS OFFICE MANAGER

CONCURRING IN THIS DETERMINATION: DATE NOT LEGIBLE
STATE OF UTAH,
DEPARTMENT OF HEALTH

#SNLD
SITE NAME, LOCATION, AND DESCRIPTION

THE MONTICELLO MILL TAILINGS SITE (THE SITE) IS LOCATED IN SAN JUAN COUNTY, UTAH, NEAR THE CITY OF MONTICELLO (FIGURE 1-1), IN THE SOUTHEASTERN CORNER OF UTAH. MILL TAILINGS AND ASSOCIATED CONTAMINATED MATERIAL REMAIN ON THE MILLSITE AS A RESULT OF MILLING FOR URANIUM AND VANADIUM. THE TAILINGS PILES ARE WITHIN THE FLOODPLAIN OF MONTEZUMA CREEK AND ARE PARTIALLY IN CONTACT WITH AN ALLUVIAL AQUIFER. TAILINGS PARTICULATE MATERIAL HAS BEEN WINDBLOWN AND TRANSPORTED BY SURFACE WATER TO PROPERTIES PERIPHERAL TO THE MILLSITE. THE SITE IS BORDERED BY LAND OWNED BY THE US DEPARTMENT OF THE INTERIOR'S BUREAU OF LAND MANAGEMENT, THE CITY OF MONTICELLO, AND PRIVATE OWNERS. NO RESIDENCES ARE LOCATED WITHIN THE MILLSITE BOUNDARY, BUT RESIDENCES ARE ADJACENT TO THE NORTH AND EAST EDGES OF THE SITE. THE CITY HAS A POPULATION OF APPROXIMATELY 1,900.

THE SITE INCLUDES THE MILLSITE, WHERE RADIOACTIVE TAILINGS AND ASSOCIATED CONTAMINATED MATERIAL ARE LOCATED, AND PERIPHERAL PROPERTIES. THE MILLSITE, A 78-ACRE TRACT WITHIN THE CITY OF MONTICELLO, IS OWNED BY THE US DEPARTMENT OF ENERGY. DURING THE PERIOD OF MILL OPERATION, PRIVATE LAND TO THE NORTH AND SOUTH OF THE EXISTING SITE WAS LEASED FOR THE STOCKPILING OF ORE. THE FORMER ORE-STOCKPILE AREAS AND AREAS CONTAMINATED BY AIRBORNE-TAILINGS PARTICULATE MATTER OR SURFACE-WATER TRANSPORT COVER APPROXIMATELY 300 ACRES AROUND THE SITE AND CONTAIN MOST OF THE ESTIMATED 300,000 CUBIC YARDS OF PERIPHERAL PROPERTY MATERIAL TO BE REMEDIATED. PERIPHERAL PROPERTIES ALSO INCLUDE THE BED AND BANKS OF A 3.3-MILE REACH OF MONTEZUMA CREEK BETWEEN THE CITY OF MONTICELLO AND VEGA CREEK.

THE MILLSITE CONSISTS OF THE FORMER MILL AREA AND THE TAILINGS-IMPOUNDMENT AREA. AN ESTIMATED 100,000 CUBIC YARDS OF CONTAMINATED MATERIAL HAVE BEEN IDENTIFIED IN THE MILL AREA; AND APPROXIMATELY 1.4 MILLION CUBIC YARDS (2 MILLION TONS) OF TAILINGS, CONTAMINATED SOIL, BY-PRODUCT MATERIAL, AND CONTAMINATED BUILDING MATERIAL ARE LOCATED IN THE TAILINGS-IMPOUNDMENT AREA. FIGURE 1-2 DEPICTS THE MILLSITE PROPERTY, ASSOCIATED BUILDINGS, AND TAILINGS PILES.

THE TAILINGS ARE CONTAINED IN FOUR PILES. THESE PILES ARE LOCATED WITHIN THE FLOODPLAIN OF MONTEZUMA CREEK. THEY ARE ALSO PARTIALLY IN CONTACT WITH A SHALLOW ALLUVIAL AQUIFER UNDERLYING THE SITE. THIS ALLUVIAL AQUIFER IS NOT PRESENTLY USED AS A PRIVATE OR PUBLIC DRINKING WATER SOURCE. HOWEVER, IT DOES HAVE A POTENTIAL FOR AGRICULTURAL USE. A DEEPER AQUIFER, BURRO CANYON, IS USED AS A DRINKING WATER SUPPLY AND MONITORING HAS SHOWN NO EVIDENCE OF CONTAMINATION. TWO AQUITARDS, THE MANCOS SHALE AND PART OF THE DAKOTA SANDSTONE, SEPARATE THE BURRO CANYON AQUIFER FROM THE OVERLYING ALLUVIAL AQUIFER UNDER MOST OF THE MILLSITE.

MONTEZUMA CREEK, WHICH FLOWS THROUGH THE MILLSITE, IS A SMALL PERENNIAL

STREAM WITH HEADWATERS IN THE ABAJO MOUNTAINS IMMEDIATELY WEST OF MONTICELLO. LOW-FLOW CONDITIONS PREVAIL IN THE LATE SUMMER, FALL, AND WINTER MONTHS. WITHIN THE PROJECT AREA, BASE FLOW IN MONTEZUMA CREEK IS MAINTAINED YEAR-ROUND BY GROUND WATER DISCHARGE FROM THE ALLUVIAL AQUIFER AND BY RELEASES FROM MONTICELLO RESERVOIR (LOCATED ON SOUTH CREEK, ONE MILE WEST OF HIGHWAY 191).

DOMESTIC SURFACE-WATER RESOURCES FOR THE MONTICELLO AREA ARE LOCATED TOPOGRAPHICALLY UPGRADIENT FROM THE SITE. THE SOURCE OF DOMESTIC WATER FOR THOSE PEOPLE LIVING OUTSIDE THE CITY OF MONTICELLO IS PREDOMINANTLY GROUND WATER, DRAWN CHIEFLY FROM WELLS DRILLED INTO THE BURRO CANYON AQUIFER.

THE TOTAL ANNUAL AVERAGE PRECIPITATION FOR THE MONTICELLO AREA DURING THE PERIOD OF 1982 THROUGH 1986 WAS 18.3 INCHES. THE ANNUAL AVERAGE POTENTIAL EVAPOTRANSPIRATION IS 24 TO 26.9 INCHES.

THE PREVAILING WINDS ARE GENERALLY FROM THE SOUTH, WEST-SOUTHWEST, AND NORTHWEST. THE STRONGEST WINDS, RANGING FROM 7 TO 13 MILES PER HOUR, ARE THOSE FROM THE SOUTH AND NORTHWEST.

WILDLIFE INHABITANTS OF THE MILLSITE ARE FEW DUE TO THE SPARSE VEGETATION ON THE TAILINGS PILES AND IN THE MILL AREA. THE ONLY "RESIDENTS" APPEAR TO BE RODENTS, THREE SPECIES OF RABBITS, AND SEVERAL SPECIES OF BIRDS. NONE OF THE WILDLIFE INHABITANTS OR VEGETATIVE SPECIES ARE CONSIDERED TO BE THREATENED OR ENDANGERED. OCCASIONALLY, TRANSIENT BIG GAME ANIMALS, SUCH AS MULE DEER, OR PREDATORS, SUCH AS COYOTES, HAVE BEEN FOUND ON THE SITE. THE ENTIRE LENGTH OF MONTEZUMA CREEK THROUGH THE SITE (17.8 ACRES) HAS BEEN DESIGNATED AS WETLANDS BY THE US ARMY CORPS OF ENGINEERS. ARCHAEOLOGICAL FINDS ARE SCATTERED OVER

SEVERAL PERIPHERAL PROPERTIES. SEVERAL SIGNIFICANT FINDS EXIST IN MONTEZUMA CREEK CANYON.

#SHEA
SITE HISTORY AND ENFORCEMENT ACTIVITIES

SITE HISTORY

IN LATE 1940, THE VANADIUM CORPORATION OF AMERICA OPENED A VANADIUM ORE-BUYING STATION AT MONTICELLO TO STIMULATE VANADIUM MINING IN THE REGION. WITHIN A YEAR, ORE PRODUCTION IN THE AREA HAD INCREASED SUFFICIENTLY TO JUSTIFY CONSTRUCTION OF A VANADIUM MILL. THE MILL WAS CONSTRUCTED BY THE VANADIUM CORPORATION OF AMERICA IN 1942 WITH FUNDS FROM THE DEFENSE PLANT CORPORATION. INITIALLY, ONLY VANADIUM WAS PRODUCED, BUT FROM 1943 TO 1944 A URANIUM-VANADIUM SLUDGE WAS PRODUCED BY THE VANADIUM CORPORATION OF AMERICA FOR THE MANHATTAN ENGINEER DISTRICT. THE ATOMIC ENERGY COMMISSION BOUGHT THE SITE IN 1948. URANIUM MILLING COMMENCED 15 SEPTEMBER 1949 AND CONTINUED UNTIL JANUARY 1960, WHEN THE MILL WAS PERMANENTLY CLOSED. PART OF THE LAND WAS

TRANSFERRED TO THE BUREAU OF LAND MANAGEMENT; THE REMAINING PARTS OF THE SITE HAVE REMAINED UNDER THE CONTROL OF THE ATOMIC ENERGY COMMISSION AND ITS SUCCESSOR AGENCIES, THE US ENERGY RESEARCH AND DEVELOPMENT ADMINISTRATION AND THE US DEPARTMENT OF ENERGY.

NUMEROUS MILLING PROCESSES WERE USED AT THE MONTICELLO MILLSITE DURING ITS TENURE OF OPERATION. THESE PROCESSES INCLUDED RAW ORE CARBONATE LEACH, LOW-TEMPERATURE ROAST/HOT CARBONATE LEACH, AND SALT ROAST/HOT CARBONATE LEACH UP TO 1955; ACID LEACH RESIN-IN-PULP AND RAW ORE CARBONATE LEACH FROM 1955 TO 1958; AND A CARBONATE PRESSURE LEACH RESIN-IN-PULP PROCESS FROM AUGUST 1958 TO MILL CLOSURE IN 1960.

IN THE SUMMER OF 1961, THE ATOMIC ENERGY COMMISSION BEGAN TO REGRADE, STABILIZE, AND VEGETATE THE PILES. THIS WORK WAS INITIATED ON THE EAST TAILINGS PILE. TAILINGS SAND WAS HAULED FROM THE OTHER THREE PILES AND SPREAD OVER THE SURFACE. AFTER THE GRADING WAS COMPLETED, FILL DIRT AND ROCK WERE SPREAD OVER THE TOPS AND SIDES OF THE PILES. THE PLANT WAS DISMANTLED AND EXCESSED BY THE END OF 1964. DURING THE SUMMER OF 1965, 6 TO 12 INCHES OF TOPSOIL WERE REMOVED FROM THE ORE-STORAGE AREAS. PHOTOGRAPHS SUGGEST THAT THE CONTAMINATED SOIL WAS USED AS FILL MATERIAL TO PARTIALLY BURY THE MILL FOUNDATIONS.

IN 1972, THE ATOMIC ENERGY COMMISSION REQUESTED ADDITIONAL RADIATION SURVEYS OF THE SOUTH STOCKPILE AREA AND THE ORE-BUYING STATION. RECOMMENDATIONS WERE MADE TO REMOVE NEARLY 15,000 CUBIC YARDS OF CONTAMINATED SOIL FROM THESE AREAS. ORE-CONTAMINATED SOIL SCRAPED FROM THE ORE-STORAGE AREAS WAS DUMPED ON THE PREVIOUSLY STABILIZED SURFACE OF THE EAST TAILINGS PILE.

THE DEPARTMENT OF ENERGY, UNDER THE AUTHORITY OF THE ATOMIC ENERGY ACT,

INITIATED THE SURPLUS FACILITIES MANAGEMENT PROGRAM IN 1978 TO ENSURE SAFE CARETAKING AND DECOMMISSIONING OF GOVERNMENT FACILITIES THAT HAD BEEN RETIRED FROM SERVICE BUT STILL CONTAINED RADIOACTIVE CONTAMINATION. IN 1980, THE MILLSITE WAS ACCEPTED INTO THE SURPLUS FACILITIES MANAGEMENT PROGRAM AND THE MONTICELLO REMEDIAL ACTION PROJECT WAS ESTABLISHED. THE INTENT OF THE PROJECT IS TO REMEDIATE THE GOVERNMENT-OWNED MILLSITE, TO DISPOSE OF OR CONTAIN THE TAILINGS IN AN ENVIRONMENTALLY SAFE MANNER, AND TO PERFORM REMEDIAL ACTIONS ON OFF-SITE (VICINITY) PROPERTIES THAT HAD BEEN CONTAMINATED BY RADIOACTIVE MATERIAL FROM THE MILL OPERATIONS.

IN 1983, REMEDIAL ACTIVITIES FOR VICINITY PROPERTIES WERE SEPARATED FROM THE MONTICELLO REMEDIAL ACTION PROJECT WITH THE ESTABLISHMENT OF THE MONTICELLO VICINITY PROPERTIES PROJECT. THE MONTICELLO VICINITY PROPERTIES PROJECT WAS LISTED ON THE NATIONAL PRIORITIES LIST IN 1986 AND IS BEING REMEDIATED PURSUANT TO A RECORD OF DECISION DATED 29 SEPTEMBER 1989. BOTH THE MONTICELLO REMEDIAL ACTION PROJECT (MONTICELLO MILL TAILINGS SITE) AND THE MONTICELLO VICINITY PROPERTIES PROJECT ARE CURRENTLY ADMINISTERED BY THE GRAND JUNCTION PROJECTS OFFICE OF THE US DEPARTMENT OF ENERGY.

ENFORCEMENT ACTIVITIES

A FEDERAL FACILITY SECTION 120 AGREEMENT WITH THE US ENVIRONMENTAL PROTECTION AGENCY AND THE STATE OF UTAH, PURSUANT TO THE SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT OF 1986, BECAME EFFECTIVE ON 24 FEBRUARY 1989. A HAZARD RANKING SYSTEM SCORE FOR THE MILLSITE WAS DEVELOPED THAT LED TO THE INCLUSION OF THE MONTICELLO MILL TAILINGS SITE ON THE ENVIRONMENTAL PROTECTION AGENCY'S NATIONAL PRIORITIES LIST ON 16 NOVEMBER 1989.

THE DEPARTMENT OF ENERGY, THE US ENVIRONMENTAL PROTECTION AGENCY, AND THE STATE OF UTAH HAVE AGREED TO PERFORM THE RESPONSE ACTION(S) AT THE MILLSITE IN ACCORDANCE WITH THE 1989 FEDERAL FACILITY AGREEMENT. AS STATED IN THE AGREEMENT, THE DEPARTMENT OF ENERGY IS A RESPONSIBLE PARTY WITH RESPECT TO PRESENT AND PAST RELEASES AT THE MILLSITE. RESPONSIBILITY FOR OVERSIGHT OF ACTIVITIES PERFORMED UNDER THE FEDERAL FACILITY AGREEMENT WILL BE SHARED BY THE ENVIRONMENTAL PROTECTION AGENCY AND THE STATE, WITH THE FORMER BEING THE LEAD AGENCY HAVING ULTIMATE RESPONSIBILITY AND AUTHORITY. THE STATE OF UTAH WILL PARTICIPATE IN PLANNING, SELECTION, AND IMPLEMENTATION OF THE REMEDIAL ACTION.

IN FEBRUARY 1990, THE DEPARTMENT OF ENERGY COMPLETED THE REMEDIAL INVESTIGATION/FEASIBILITY STUDY-ENVIRONMENTAL ASSESSMENT (DOE/EA-0424) FOR THE MILLSITE. THE REMEDIAL INVESTIGATION/FEASIBILITY STUDY WAS SUPPLEMENTED TO INCLUDE ANALYSES SUFFICIENT TO ENABLE THE DEPARTMENT OF ENERGY TO ASSESS THE IMPACTS OF THE REMEDIAL ACTION ALTERNATIVES CONSIDERED IN TERMS OF THE REQUIREMENTS OF THE NATIONAL ENVIRONMENTAL POLICY ACT.

#HCP
HIGHLIGHTS OF COMMUNITY PARTICIPATION

THE REMEDIAL INVESTIGATION/FEASIBILITY STUDY AND THE PROPOSED PLAN FOR THE MONTICELLO MILL TAILINGS SITE WERE MADE AVAILABLE TO THE PUBLIC FOR COMMENT ON 27 OCTOBER 1989. A PUBLIC COMMENT PERIOD ON THE DOCUMENTS WAS HELD FROM 27 OCTOBER 1989 TO 25 NOVEMBER 1989. THIS COMMENT PERIOD WAS EXTENDED THROUGH 19 DECEMBER 1989 TO ACCOMMODATE ADDITIONAL COMMENTS. A PUBLIC MEETING WAS HELD ON 16 NOVEMBER 1989. RESPONSES TO COMMENTS RECEIVED ARE INCLUDED IN THE RESPONSIVENESS SUMMARY (APPENDIX A).

THIS DECISION DOCUMENT PRESENTS THE SELECTED REMEDIAL ACTION FOR TWO OF THE THREE OPERABLE UNITS AT THE MONTICELLO MILL TAILINGS SITE IN MONTICELLO, UTAH, CHOSEN IN ACCORDANCE WITH THE COMPREHENSIVE ENVIRONMENTAL RESPONSE, COMPENSATION, AND LIABILITY ACT, AS AMENDED BY THE SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT, AND THE NATIONAL CONTINGENCY PLAN. THE DECISION FOR REMEDIATION OF THIS SITE IS BASED ON THE ADMINISTRATIVE RECORD. THIS DOCUMENT ADDRESSES THE MILLSITE

(OPERABLE UNIT I) AND THE PERIPHERAL PROPERTIES (OPERABLE UNIT II).

#SROU
SCOPE AND ROLE OF OPERABLE UNITS WITHIN SITE STRATEGY

THE DEPARTMENT OF ENERGY, WITH CONCURRENCE FROM THE ENVIRONMENTAL PROTECTION AGENCY AND THE STATE OF UTAH, ORGANIZED THE REMEDIAL WORK INTO THREE OPERABLE UNITS. THESE ARE:

* OPERABLE UNIT I: MILL TAILINGS AND MILLSITE PROPERTY
* OPERABLE UNIT II: PERIPHERAL PROPERTIES
* OPERABLE UNIT III: GROUND WATER AND SURFACE WATER

THE REMEDIAL ACTIONS PLANNED FOR THESE OPERABLE UNITS ARE INTERDEPENDENT. THIS RECORD OF DECISION ADDRESSES THE REMEDIAL ACTIONS FOR OPERABLE UNITS I AND II. FOLLOWING THE INITIATION OF REMEDIAL ACTION FOR OPERABLE UNITS I AND II AND COLLECTION OF ADDITIONAL SURFACE-AND GROUND WATER MONITORING DATA, A RECORD OF DECISION WILL BE PREPARED FOR OPERABLE UNIT III.

OPERABLE UNIT I ADDRESSES THE TAILINGS, ORE, AND MILLING BY-PRODUCT MATERIALS. THIS OPERABLE UNIT ALSO INCLUDES CONTAMINATED BUILDINGS AND EQUIPMENT, AND CONTAMINATED SOILS AT THE MILLSITE. THE PRINCIPAL THREATS TO PUBLIC HEALTH FROM THE TAILINGS AND ASSOCIATED MATERIALS ARE EXPOSURE TO RADON GAS AND GAMMA RADIATION. NONRADIOLOGICAL RISKS HAVE BEEN SHOWN TO BE MINOR IN COMPARISON TO THE RADIOLOGIC RISK. ADDITIONAL ENVIRONMENTAL THREATS INCLUDE SURFACE-WATER CONTAMINATION OF MONTEZUMA CREEK AND RADIOLOGICAL CONTAMINATION FOUND IN THE ALLUVIAL AQUIFER DUE TO TAILINGS IN CONTACT WITH THAT AQUIFER. THE REMEDIATION OF OPERABLE

UNIT I WILL REDUCE HEALTH THREATS FROM TAILINGS AND ASSOCIATED MATERIAL TO ACCEPTABLE LEVELS, AND WILL REDUCE THE POTENTIAL FOR FURTHER CONTAMINATION BY REMOVING AND CONTAINING THE CONTAMINATION SOURCE.

OPERABLE UNIT II ADDRESSES THE PROPERTIES PERIPHERAL TO THE MILLSITE CONTAMINATED BY WIND-BLOWN TAILINGS PARTICULATE MATTER, TAILINGS MIGRATION VIA SURFACE WATER, AND RESIDUAL RADIOACTIVE MATERIAL AT ORE-BUYING STATIONS. NINE SEPARATE LAND TYPES HAVE BEEN IDENTIFIED, INCLUDING THE MONTICELLO CEMETERY, PASTURE LAND, HILLSIDES, CREEK-BOTTOM AREAS, AND MONTEZUMA CREEK. REMEDIAL ACTION ACTIVITIES MAY SHOW THAT THE AREAL EXTENT OF PERIPHERAL PROPERTIES DIFFERS FROM THE CURRENT ESTIMATED ACREAGE. THE PRINCIPAL THREATS TO THE PUBLIC FROM PERIPHERAL PROPERTIES ARE EXPOSURE TO GAMMA RADIATION AND RADON GAS. THE CONTAMINATED SOIL OF PERIPHERAL PROPERTIES GENERALLY EXHIBITS LOWER LEVELS OF CONTAMINATION WHEN COMPARED TO THE MILL TAILINGS. THE REMEDIAL RESPONSE TO OPERABLE UNIT II WOULD REMOVE AND/OR CONTROL THE SOURCE OF THESE HEALTH THREATS.

DURING THE REMEDIAL ACTION OF OPERABLE UNITS I AND II, THE CHARACTERISTICS OF OPERABLE UNIT III (GROUND WATER AND SURFACE WATER)

WILL NECESSARILY BE ALTERED. SOURCE REMOVAL WILL CAUSE THREE CHANGES TO THE ALLUVIAL AQUIFER: (1) THE DIVERSION OF SURFACE WATER WILL CAUSE UNKNOWN EFFECTS IN THE GEOCHEMICAL ATTENUATION OF SOILS BELOW THE SITE; (2) DEWATERING OF TAILINGS DURING EXCAVATION ACTIVITIES AND RELOCATION TO THE REPOSITORY MAY RESULT IN REMOVING A LARGE AMOUNT OF WATER FROM THE ALLUVIAL AQUIFER. THIS WATER WILL BE TREATED IN ACCORDANCE WITH THE CLEAN WATER ACT, UTAH POLLUTION DISCHARGE ELIMINATION SYSTEM, AND OTHER APPLICABLE REGULATIONS; AND (3) CONTAMINATED PORE-WATER RETAINED IN THE CONTAMINATED SOILS WILL ALSO BE REMOVED, TREATED TO ACCEPTABLE STANDARDS, AND RELEASED. REMOVAL OF CONTAMINATED SEDIMENTS IN MONTEZUMA CREEK WILL AFFECT THE CONTAMINATION LEVELS IN THE CREEK. SINCE THE RESULTS OF THESE CHANGES WILL HAVE AN UNKNOWN EFFECT, A MONITORING PROGRAM FOR THE ALLUVIAL AND BURRO CANYON AQUIFERS AND MONTEZUMA CREEK WILL BE CONDUCTED DURING REMEDIATION OF OPERABLE UNITS I AND II. THIS MONITORING PROGRAM WILL CONTINUE FOR THREE YEARS FOLLOWING REMOVAL OF THE CONTAMINATED MATERIAL. UPON COLLECTION OF ADEQUATE DATA TO SUPPORT SELECTION OF A REMEDIAL ACTION AND THE COMPLETION OF A REMEDIAL INVESTIGATION/FEASIBILITY STUDY, A RECORD OF DECISION WILL THEN BE PREPARED FOR OPERABLE UNIT III.

#SSC
SUMMARY OF SITE CHARACTERISTICS

MILL TAILINGS

THE URANIUM MILL TAILINGS CHARACTERIZATION INCLUDED SAMPLING FOR RADIUM-226 AND URANIUM TO DESCRIBE THE URANIUM-238 DECAY SERIES. A NUMBER OF ELEMENTS ARE GENERALLY PRESENT IN URANIUM MILL TAILINGS IN CONCENTRATIONS ABOVE BACKGROUND. THIS CHARACTERISTIC IS DUE TO THEIR

ELEVATED LEVELS IN URANIUM ORES AS WELL AS BEING CONCENTRATED AS A CONSEQUENCE OF MILLING OPERATIONS. NONRADIOACTIVE ELEMENTS SAMPLED FOR IN THE TAILINGS CHARACTERIZATION WERE ANTIMONY, ARSENIC, BERYLLIUM, CADMIUM, CHROMIUM, COPPER, LEAD, MERCURY, MOLYBDENUM, NICKEL, SELENIUM, SILVER, THALLIUM, VANADIUM, AND ZINC.

THE TAILINGS GENERATED BY THE MILLSITE OPERATIONS ARE CONTAINED IN FOUR PILES REFERRED TO, IN ORDER OF THEIR CONSTRUCTION, AS THE CARBONATE PILE, VANADIUM PILE, ACID PILE, AND THE EAST PILE. THE CARBONATE AND VANADIUM PILES WERE CONSTRUCTED WHEN THE MILL WAS RECOVERING VANADIUM AS A BY-PRODUCT USING A SALT ROAST/CARBONATE LEACH FLOW SHEET. THE ACID PILE RECEIVED TAILINGS FROM THE ACID LEACH RESIN-IN-PULP PROCESS AND A CARBONATE LEACH CIRCUIT. THE EAST PILE RECEIVED TAILINGS FROM THE ACID LEACH CIRCUIT AND THE HIGH-TEMPERATURE, CARBONATE LEACH RESIN-IN-PULP CIRCUIT.

RESULTS OF THE MILL TAILINGS CHARACTERIZATION INDICATE THAT ARSENIC, CADMIUM, CHROMIUM, COPPER, LEAD, MOLYBDENUM, RADIUM-226, URANIUM, VANADIUM, AND ZINC ARE ENRICHED IN THE TAILINGS DUE TO THE MILLING PROCESS. THE CARBONATE AND VANADIUM PILES ARE DISTINCTLY HIGH IN

VANADIUM AND CONTRAST SHARPLY IN THIS RESPECT WITH THE EAST AND ACID PILES. BERYLLIUM, COPPER, MOLYBDENUM, NICKEL, AND SELENIUM ARE FOUND IN HIGHER CONCENTRATIONS IN THE EAST AND ACID PILES.

SOIL

SURFACE SOIL ON THE MILLSITE AND THE PERIPHERAL PROPERTIES HAS BEEN CONTAMINATED BY TAILINGS AND ORE RESIDUE FROM MILL OPERATIONS THROUGH THE STORAGE OF ORE IN OPEN STOCKPILES, THE EMISSIONS FROM THE ROASTER STACK, THE OVERFLOW OF TAILINGS PONDS, AND THE EROSION OF TAILINGS PILES BY WIND AND WATER. THE DISPERSAL OF TAILINGS AND ORE RESIDUES HAS CONTAMINATED SOIL WITH BOTH RADIOACTIVE AND NONRADIOACTIVE ELEMENTS. AREAS ARE CONSIDERED CONTAMINATED IF THE RADIUM-226 CONCENTRATION IN SOILS EXCEEDS THE ENVIRONMENTAL PROTECTION AGENCY STANDARD (40 CFR 192.12) OF 5 PCI/G ABOVE BACKGROUND IN THE TOP 15 CM OF SOIL OR 15 PCI/G ABOVE BACKGROUND IN ANY 15 CM LAYER BELOW THE TOP 15 CM. A SUMMARY OF MILLSITE CONTAMINATION AS COMPARED TO THE STANDARDS IS PRESENTED IN TABLE 5-1.

THE CONTAMINATION OF SURFACE SOIL BY THESE RADIOACTIVE AND NONRADIOACTIVE ELEMENTS WAS PORTRAYED BY MAPPING THE DISTRIBUTION OF RADIUM-226. THE USE OF RADIUM AS A PROXY FOR OTHER METALS CONTAINED IN THE ORE AND TAILINGS IS JUSTIFIED BECAUSE THE OTHER ELEMENTS, EXCLUDING URANIUM AND VANADIUM, PASSED THROUGH THE MILL CIRCUIT WITH RADIUM TO THE TAILINGS PILES WHERE THEY RESIDE IN CONCENTRATIONS APPROXIMATING THOSE FOUND IN ORE. FURTHER, NO TRANSPORT MECHANISM HAS BEEN IDENTIFIED THAT WOULD ACCOUNT FOR THE SEGREGATION AND DISPERSAL OF ONE OF THE NON-ORE ELEMENTS INDEPENDENTLY OF OTHERS.

DETAILS OF THE RADIUM MAPPING AND SAMPLING ACTIVITIES ARE FOUND IN THE

REMEDIAL INVESTIGATION REPORT. ANALYTICAL RESULTS ON SOIL SAMPLES, TOGETHER WITH RESULTS OF IN-SITU SPECTROMETER MEASUREMENTS, INDICATE AN AVERAGE BACKGROUND RADIUM-226 CONCENTRATION OF 1.0 + 0.4 PICOCURIES PER GRAM (PCI/G) FOR SURFACE AND SUBSURFACE SOILS.

TABLE 5-1. AVERAGE RADIUM-226 CONCENTRATIONS IN TAILINGS PILES AND MILLSITE SOIL, AS COMPARED TO CLEAN-UP STANDARDS

LOCATION	AVERAGE RADIUM-226 CONCENTRATION	STANDARD-1 (PCI/G)
CARBONATE PILE	APPROXIMATELY 870 PCI/G	5/15
VANADIUM PILE	APPROXIMATELY 460 PCI/G	5/15
ACID PILE	APPROXIMATELY 750 PCI/G	5/15
EAST PILE	APPROXIMATELY 590 PCI/G	5/15
SURFACE SOIL (MILLSITE)	20 PCI/G	5
SUBSURFACE (MILLSITE)	N/A2	15
BACKGROUND	1.0 PLUS AND MINUS 0.4 PCI/G	

(1) 40 CFR 192.12, LAND CLEAN-UP STANDARDS ARE GIVEN AS PCI/G ABOVE

BACKGROUND. "5" INDICATES 5 PCI/G AVERAGED OVER THE FIRST 15 CM OF SOIL BELOW THE SURFACE; "15" INDICATES 15 PCI/G AVERAGED OVER 15 CM THICK LAYERS OF SOIL MORE THAN 15 CM BELOW THE SURFACE.

(2) AN AVERAGE RADIUM-226 CONCENTRATION FOR ALL SUBSURFACE SOIL AREAS ON THE MILLSITE WAS NOT CALCULATED. RADIUM-226 CONCENTRATIONS IN SUBSURFACE SOIL FOR OFF-PILE AREAS GENERALLY DO NOT EXCEED THE STANDARD BELOW 6.5 FT. SOIL AND ALLUVIUM BENEATH THE TAILINGS PILES MAY EXCEED THE STANDARD AS DEEP AS 18 FT., GENERALLY.

MILLSITE

MOST OF THE SURFACE-SOIL LAYER ON THE MILLSITE CONTAINS CONCENTRATIONS OF RADIUM-226 EXCEEDING ENVIRONMENTAL PROTECTION AGENCY STANDARDS. CONTAMINATION OF THE COVER-SOIL MATERIAL ON THE PILES IS BELIEVED TO BE DUE LARGELY TO THE REDISTRIBUTION OF TAILINGS BY BURROWING ANIMALS. SOME SURFACE-SOIL CONTAMINATION ON THE EAST PILE WAS CAUSED BY THE DISPOSAL OF CONTAMINATED SOIL DURING THE 1974 TO 1975 PERIPHERAL PROPERTIES CLEAN-UP ACTIVITIES.

THE AVERAGE CONCENTRATION OF RADIUM-226 IN THE SURFACE-SOIL LAYER IS 20 PCI/G FOR THE MILLSITE. THE TOTAL RADIUM-226 ACTIVITY OF THE SURFACE LAYER (0-15 CM) IS ESTIMATED TO BE 4 TO 5 CURIES.

RADIOMETRIC LOGS OF BORINGS DRILLED ON THE MILLSITE INDICATE APPARENT RADIUM-226 CONTAMINATION OF SUBSURFACE MATERIALS. IN OFF-PILE AREAS, CONTAMINATED SOIL EXCEEDING THE ENVIRONMENTAL PROTECTION AGENCY SUBSURFACE CRITERION OF 15 PCI/G ABOVE BACKGROUND EXTENDS NO DEEPER THAN ABOUT 4 TO 6.5 FEET AND SOME AREAS SHOW NO SUBSURFACE RADIUM CONTAMINATION. ENVIRONMENTAL PROTECTION AGENCY STANDARDS MAY BE

EXCEEDED AS DEEP AS 15 TO 18 FEET IN THE SOIL AND ALLUVIUM BENEATH THE TAILINGS PILES. IN AREAS WHERE CONTAMINATED BUILDING MATERIAL AND BY-PRODUCT MATERIAL MAY BE BURIED, STANDARDS ARE ALSO EXPECTED TO BE EXCEEDED.

PERIPHERAL PROPERTIES

RADIOLOGICALLY CONTAMINATED AREAS ADJACENT TO THE MILLSITE INCLUDE TWO FORMER ORE-STORAGE AREAS, THE WEIGH STATION, THE BUYING STATION, MILL BUILDINGS, THREE RESIDENCES, AND FARMING PROPERTIES, TOTALING APPROXIMATELY 300 ACRES. APPROXIMATELY 200 ACRES ARE AFFECTED BY RADIUM-226 LEVELS THAT EXCEED ENVIRONMENTAL PROTECTION AGENCY STANDARDS AT 40 CFR 192.12. IT IS PROBABLE THAT FORMER ORE STORAGE AREAS AND OTHER PROPERTIES HAVE BURIED BY-PRODUCT MATERIAL OR CONTAMINATED BUILDING AND EQUIPMENT MATERIAL THAT MAY CAUSE ELEVATED CONCENTRATIONS OF RADIOACTIVE CONSTITUENTS. WINDBLOWN AND WATERBORNE RADIUM-226 CONTAMINATION EXTENDS TO THE NORTH AND EAST INTO RESIDENTIAL AND FARMING PROPERTIES.

THE WEIGHTED AVERAGE DEPTH OF RADIUM-226 CONTAMINATION IS 0.9 FEET; THE

RANGE IS FROM 0.5 FOOT TO GREATER THAN 6 FEET. RADIUM-226 AT A CONCENTRATION GREATER THAN 500 PCI/G WAS FOUND IN AN ORE-STOCKPILE AREA SOUTH OF MONTEZUMA CREEK AND WEST OF THE ACID PILE. RADIUM CONCENTRATIONS ABOVE THE ENVIRONMENTAL PROTECTION AGENCY STANDARDS RANGE FROM 6 PCI/G TO 7185 PCI/G.

AIR

TWO TYPES OF SUBSTANCES WITH THE POTENTIAL TO ADVERSELY AFFECT AIR QUALITY HAVE BEEN IDENTIFIED AT THE SITE: RADON-222, A RADIOACTIVE GAS PRODUCED BY THE NATURAL DECAY OF RADIUM-226, AND AIRBORNE RADIOACTIVE AND NONRADIOACTIVE PARTICLES ASSOCIATED WITH THE TAILINGS. ENVIRONMENTAL MONITORING PROGRAMS WERE ESTABLISHED BOTH ON AND OFF THE MILLSITE IN 1983 TO EVALUATE THE RADON LEVELS AND TO MEASURE SELECT ELEMENTS IN THE TOTAL SUSPENDED PARTICULATE BURDEN. THE FOLLOWING SUBSECTIONS SUMMARIZE THE CONTAMINANT CONCENTRATIONS FOUND AND IDENTIFY THE APPLICABLE REGULATORY STANDARDS ASSOCIATED WITH EACH CONTAMINANT. DETAILS OF THE SAMPLING METHODOLOGY AND RESULTS APPEAR IN THE REMEDIAL INVESTIGATION REPORT.

ATMOSPHERIC RADON

THE ENVIRONMENTAL PROTECTION AGENCY STANDARD (40 CFR PART 192) FOR ATMOSPHERIC RADON GAS CONCENTRATION AT THE EDGE OF AN INACTIVE URANIUM MILL TAILINGS PILE IS 0.50 PICOCURIE PER LITER (PCI/L) ABOVE BACKGROUND. THEREFORE, THE SITE-SPECIFIC STANDARD IS CALCULATED TO BE 0.91 PCI/L, USING 0.41 PCI/L AS THE AVERAGE ANNUAL BACKGROUND FOR MONTICELLO (INFERRED BY EXAMINING RESULTS FROM AND AT EVERY EDGE-OF-PILE LOCATION). THE ONLY OFF-SITE LOCATION WHERE CONTAMINATION EXCEEDS THE STANDARD IS A SINGLE SAMPLING STATION LOCATED APPROXIMATELY

1,700 FEET EAST OF THE MILLSITE BOUNDARY. THE CONTAMINATION RESULTS FROM THE WIND-BLOWN MATERIALS. RADON GAS CONCENTRATIONS WERE FOUND TO BE THE SAME AS BACKGROUND AT A SAMPLE SITE LOCATED 1100 FEET NORTHWEST OF THE DEPARTMENT OF ENERGY PROPERTY BOUNDARY.

AN ATMOSPHERIC TRANSPORT MODEL WAS USED TO ESTIMATE THE ATMOSPHERIC DISPERSION OF RADON GAS ATTRIBUTABLE TO THE MILLSITE. THE PREDICTED CONCENTRATION IN EXCESS OF BACKGROUND FOR THE ENTIRE MONTICELLO AREA IS 0.06 PCI/L.

RADON GAS EMISSIONS

ON-SITE MEASUREMENTS INDICATE THAT THE ENVIRONMENTAL PROTECTION AGENCY STANDARD (40 CFR 192) FOR RADON EMISSIONS AT INACTIVE URANIUM MILL PROCESSING SITES (20 PICOCURIES PER SQUARE METER-SECOND (PCIM-2SEC-1)) IS EXCEEDED AT EACH OF THE FOUR TAILINGS PILES. THE WEIGHTED-AVERAGE RADON EMISSION AT THE CARBONATE PILE WAS HIGHEST AT 765 PCIAM-2ASEC-1.

OFF-SITE MEASUREMENTS SHOW ELEVATED RADON GAS CONCENTRATIONS IN AN AREA

EXTENDING SOUTHEAST FROM THE MILLSITE PROPERTY BOUNDARY TO WITHIN 150 FEET OF THE SAMPLING STATION LOCATED APPROXIMATELY 1,700 FEET EAST OF THE PROPERTY BOUNDARY. IT IS SUSPECTED THAT TAILINGS WERE PHYSICALLY TRANSPORTED FROM THE MILLSITE AND DEPOSITED ON A NARROW ALLUVIAL FLOODPLAIN IN THIS AREA. THIS SOURCE IS ESTIMATED TO COVER 29,766 SQUARE METERS. THE MAXIMUM RADON EMISSION IN THE AREA IS 65 PLUS AND MINUS 3 PCIAM-2ASEC(-1)

AIR-PARTICULATE LEVELS

CONTINUAL AIR PARTICULATE MONITORING WAS INITIATED AT THE MONTICELLO SITE IN AUGUST 1983. SAMPLING STATIONS AT THE SITE WERE LOCATED ALONG THE PATHS OF THE PREVAILING WIND DIRECTIONS, TO THE NORTH AND TO THE EAST (AS DETERMINED BY WINDROSE DATA). IN ADDITION, A BACKGROUND STATION WAS ESTABLISHED WEST OF THE SITE.

NO DEPARTMENT OF ENERGY LIMITS FOR RADIOACTIVE PARTICULATES (THE LIMITS ABOVE BACKGROUND AS STATED IN DOE ORDER 5480.1 ARE 3.0 UCI/M(3) FOR RADIUM-226 AND 9 UG/M(3) FOR URANIUM-238) WERE EXCEEDED, ACCORDING TO MEASUREMENTS TAKEN BOTH ON AND OFF SITE. THE RESULTS OF SAMPLING WERE ALSO COMPARED TO BACKGROUND MEASUREMENTS TAKEN AT OTHER RURAL AREAS IN THE WESTERN UNITED STATES. THE LEVELS FOUND AT THE MONTICELLO MILLSITE WERE SEVERAL ORDERS OF MAGNITUDE LOWER THAN THOSE AT OTHER LOCATIONS. THE AVERAGE AIR PARTICULATE RADIUM-226 AND URANIUM-238 CONCENTRATIONS AT THE MILLSITE WERE 0.0006 PCI/M(3) RADIUM-226 AND LT 0.0012 UG/M(3) URANIUM, RESPECTIVELY.

MONTEZUMA CREEK

STREAM SEDIMENTS

SEVERAL STUDIES WERE PERFORMED FOLLOWING MILL CLOSURE TO ASSESS THE LEVELS OF RADIUM-226 IN SEDIMENTS OF MONTEZUMA CREEK DOWNSTREAM FROM THE MONTICELLO MILLSITE. DATA FROM THESE EARLY STUDIES REVEALED THAT HIGH CONCENTRATIONS OF RADIUM-226 PERSISTED IN THE SEDIMENTS OF MONTEZUMA CREEK. THESE HIGH CONCENTRATIONS WERE PROBABLY ATTRIBUTABLE TO BEDLOAD TRANSPORT OF SANDY TAILINGS MATERIAL ERODED FROM THE PILES DURING MILL OPERATIONS.

DATA FROM A 1987 SURVEY PROVIDE A MORE DETAILED PORTRAYAL OF THE RADIUM DISTRIBUTION ALONG THE CREEK BECAUSE SAMPLES WERE COLLECTED FROM STREAM BANKS AND FLOODPLAIN SOIL NEAR THE CREEK AS WELL AS FROM THE CHANNEL ITSELF. SUBSTANTIAL RADIUM CONTAMINATION EXISTS IN AND ADJACENT TO MONTEZUMA CREEK TO A POINT ABOUT 1,600 FEET EAST OF THE MILLSITE. DOWNSTREAM FROM THIS POINT, CONCENTRATIONS OF 1 TO 60 PCI/G ARE TYPICAL, ALTHOUGH CONCENTRATIONS OF 100 PCI/G AND HIGHER OCCUR SPORADICALLY. SEDIMENTS ARE CONSIDERED CONTAMINATED WHEN THE CONCENTRATION OF RADIUM-226 EXCEEDS THE 40 CFR 192.12 STANDARD OF 5 PCI/G ABOVE BACKGROUND IN THE TOP 15 CM OF SEDIMENT OR 15 PCI/G ABOVE BACKGROUND IN ANY 15 CM LAYER BELOW THE TOP 15 CM.

SURFACE WATER

A SUMMARY OF THE CURRENT SURFACE WATER CONTAMINATION IS PRESENTED HERE SO THAT THE EXTENT OF CONTAMINATION DUE TO THE MILLSITE MAY BE BETTER UNDERSTOOD. THE EXISTING SURFACE WATER CHARACTERIZATION ALSO PROVIDES A BASELINE FOR FURTHER CHARACTERIZATION TO BE PERFORMED FOLLOWING MILLSITE REMEDIATION, UNDER OPERABLE UNIT III.

BACKGROUND SURFACE-WATER QUALITY HAS BEEN MONITORED FOR SOME YEARS AT A POINT ON MONTEZUMA CREEK EAST OF THE CULVERT UNDER HIGHWAY 191, UPSTREAM FROM THE MILLSITE. THE WATER HAS BEEN CHARACTERIZED AS HAVING LOW OR NONDETECTABLE LEVELS OF HEAVY METALS OR MILL-TAILINGS-RELATED MATERIAL. MONTEZUMA CREEK FLOWS THROUGH THE MIDDLE OF THE MILLSITE. FLOW IS PERENNIAL, ALTHOUGH IT CAN BE QUITE LOW DURING THE LATE SUMMER. DATA OBTAINED FROM A SEPTEMBER 1981 INTENSIVE SAMPLING OF THE CREEK INDICATE THAT URANIUM CONCENTRATIONS IN THE CREEK BEGIN TO INCREASE (0.29 MG/L URANIUM) UPSTREAM FROM THE POINT AT WHICH THE CREEK TRAVERSES THE ACTUAL TAILINGS PILES. URANIUM LEVELS IN THE CREEK INCREASE BY AN ADDITIONAL 40 TO 50 PERCENT TOWARD THE DOWNSTREAM BOUNDARY OF THE MILLSITE. CONCENTRATIONS OF ARSENIC, MOLYBDENUM, VANADIUM, AND URANIUM INCREASE DOWNSTREAM FROM THE ENTRANCE OF A SEEP (LOCATED BETWEEN THE CARBONATE AND VANADIUM PILES) INTO THE CREEK. ON THE DOWNSTREAM SIDE OF THE VANADIUM PILE, CONCENTRATIONS OF URANIUM, MOLYBDENUM, SELENIUM, VANADIUM, AND RADIUM CONTINUE TO INCREASE.

SEEPS ISSUING FROM AN ALLUVIAL AQUIFER INCREASE THE CONCENTRATION OF URANIUM IN THE CREEK BY AS MUCH AS AN ORDER OF MAGNITUDE IN THE FIRST 160 TO 330 FEET DOWNSTREAM FROM THE MILLSITE. SAMPLES COLLECTED 1/2 MILE DOWNSTREAM FROM THE MILLSITE SHOW AN AVERAGE CONCENTRATION OF 0.183

MG/L URANIUM. IN ADDITION, FOUR MILES DOWNSTREAM FROM THE MILLSITE, THE SALT WASH MEMBER OF THE MORRISON FORMATION CONTRIBUTES MEASURABLE AMOUNTS OF URANIUM TO MONTEZUMA CREEK. THIS CONTRIBUTION IS RESPONSIBLE, IN PART, FOR MAINTAINING THE HIGH URANIUM CONCENTRATIONS (AS HIGH AS 0.22 MG/L) OBSERVED AT THE MONTEZUMA CANYON SAMPLING LOCATION, 6 MILES BELOW THE MILLSITE.

OTHER MILL TAILINGS CONSTITUENTS HAVE BEEN SAMPLED FOR IN MONTEZUMA CREEK AND COMPARED WITH FEDERAL WATER-QUALITY STANDARDS AND STATE OF UTAH WATER-QUALITY STANDARDS. SAMPLES WERE COLLECTED EAST OF THE TAILING SITE DOWNSTREAM FROM THE AQUIFER RECHARGE AREA. THE COMPARISON OF THE SURFACE-WATER SAMPLING DATA TO STATE AND FEDERAL WATER-QUALITY STANDARDS INDICATES THAT GROSS ALPHA-PARTICLE ACTIVITY, ARSENIC, MOLYBDENUM, MANGANESE, SELENIUM, ZINC AND PH EXCEED RECOMMENDED CONCENTRATION LEVELS. THE POTENTIAL FOR EXPOSURE TO THESE ELEMENTS SUGGESTS THAT THIS WATER SHOULD NOT BE USED FOR DRINKING BY HUMANS OR CATTLE AND THAT REMEDIAL ACTION SHOULD BE TAKEN TO IMPROVE SURFACE-WATER QUALITY.

GROUND WATER

A SUMMARY OF THE ALLUVIAL AQUIFER CONTAMINATION IS PRESENTED HERE SO THAT THE EXTENT OF CONTAMINATION FROM THE MILLSITE IS BETTER UNDERSTOOD. THE EXISTING GROUND WATER CHARACTERIZATION ALSO PROVIDES A BASELINE FOR FURTHER CHARACTERIZATION OF THE GROUND WATER, WHICH WILL OCCUR DURING AND FOLLOWING REMEDIATION OF THE MILLSITE AND PERIPHERAL PROPERTIES. A RECORD OF DECISION WILL BE PREPARED WHEN SUFFICIENT DATA HAVE BEEN GATHERED TO WARRANT A FINAL DECISION FOR RESTORATION OF THE ALLUVIAL AQUIFER.

ANALYTICAL DATA FROM SAMPLES OBTAINED FROM SEVEN ON-SITE WELLS DRILLED INTO THE ALLUVIAL AQUIFER AND SAMPLED FOR NONRADIOACTIVE ELEMENTS ASSOCIATED WITH MILL TAILINGS (THESE ELEMENTS ARE IDENTIFIED IN SECTION 5.1), AND FOR URANIUM, RADIUM, AND VANADIUM, SHOW CONSIDERABLY ELEVATED CONCENTRATIONS IN COMPARISON WITH THE UPGRADIENT WELLS. IN GENERAL, THE HIGHEST CONCENTRATIONS ARE ASSOCIATED DIRECTLY WITH THE TAILINGS AREA. MANY OF THE HIGHEST CONCENTRATIONS OF NONRADIOACTIVE AND RADIOACTIVE ELEMENTS ARE FROM WELLS DRILLED IN THE VICINITY OF THE CARBONATE AND VANADIUM PILES AND FROM A WELL LOCATED NEAR THE EAST EDGE OF THE MILLSITE PROPERTY.

WELLS LOCATED DOWNGRADIENT FROM THE MILLSITE TYPICALLY HAVE NONRADIOACTIVE AND RADIOACTIVE ELEMENT CONCENTRATIONS THAT ARE ELEVATED IN COMPARISON WITH UPGRADIENT WELLS. FOR EXAMPLE, THE MAXIMUM ARSENIC CONCENTRATION FOUND IN UPGRADIENT WELLS IS 0.01 MG/L AND THE MAXIMUM DOWNGRADIENT IS 0.02 MG/L FOR THE PERIOD 1984-1986. FOR URANIUM, THE MAXIMUM UPGRADIENT WELL CONCENTRATION FOR THE SAME PERIOD IS 0.019 MG/L AND THE MAXIMUM DOWNGRADIENT IS 0.8 MG/L. THE SOUTHWARD EXTENT OF OFFSITE ALLUVIAL AQUIFER CONTAMINATION IS LIMITED BY MONTEZUMA CREEK, WHERE THE CREEK ENTERS MONTEZUMA CANYON.

GROUND WATER SAMPLES COLLECTED FROM WELLS LOCATED DOWNGRADIENT FROM THE MILLSITE AND COMPLETED IN THE BURRO CANYON FORMATION ARE SIMILAR TO THOSE OBSERVED IN THE UPGRADIENT WELL IN THE ALLUVIAL AQUIFER, SUGGESTING THAT THE BURRO CANYON AQUIFER IS NOT AFFECTED BY THE CONTAMINATED ALLUVIAL AQUIFER. ELEVATED LEVELS OF NONRADIOACTIVE AND RADIOACTIVE ELEMENTS FOUND DOWNGRADIENT IN THE ALLUVIAL AQUIFER ARE NOT FOUND IN THE BURRO CANYON AQUIFER. CURRENT DATA SHOW THE AVERAGE URANIUM CONCENTRATION FOR THREE DOWNGRADIENT WELLS IN THE ALLUVIAL AQUIFER IS 0.41 MG/L, WHEREAS THE AVERAGE URANIUM CONTENT OF DOWNGRADIENT WELLS IN THE BURRO CANYON AQUIFER IS APPROXIMATELY 0.002 MG/L.

#SSR
SUMMARY OF SITE RISKS

A BASELINE RISK ASSESSMENT WAS CONDUCTED TO EVALUATE THE PUBLIC HEALTH AND ENVIRONMENTAL RISKS RESULTING FROM THE EXISTING CONTAMINATION AT THE MILLSITE. THE RISK RESULTING FROM GROUND WATER AND SURFACE-WATER

CONTAMINATION WILL BE ADDRESSED IN DETAIL AFTER REMEDIATION OF THE MILLSITE AND PERIPHERAL PROPERTIES BEGINS. ACTUAL OR THREATENED RELEASES OF HAZARDOUS SUBSTANCES FROM THIS SITE, IF NOT ADDRESSED BY THE PREFERRED ALTERNATIVE OR ONE OF THE OTHER ACTIVE MEASURES CONSIDERED, MAY PRESENT AN IMMINENT AND SUBSTANTIAL ENDANGERMENT TO PUBLIC HEALTH, WELFARE, OR THE ENVIRONMENT. THE FOLLOWING RISK SUMMARY EXPLAINS WHY THIS ENDANGERMENT EXISTS. INFORMATION INCLUDED IN THIS SUMMARY HAS BEEN EXCERPTED FROM CHAPTER 8 OF THE REMEDIAL INVESTIGATION REPORT WHERE DETAILS OF THE ASSESSMENT CAN BE FOUND.

THE RADIOLOGIC HEALTH THREAT IS ATTRIBUTED PREDOMINANTLY TO URANIUM AND RADIUM-226. URANIUM IS A HEALTH CONCERN AS WELL DUE TO ITS TOXICITY. OF THE NONRADIOLOGIC ELEMENTS, ARSENIC IS A PROVEN CARCINOGEN. THE OTHER ELEMENTS ARE POTENTIAL HEALTH CONCERNS DEPENDING UPON THE CONCENTRATION AND TYPE OF EXPOSURE.

DISPERSION OF URANIUM MILL TAILINGS FROM THE MILLSITE OCCURS THROUGH NATURAL AND MAN-CAUSED ACTIONS. WIND- AND SURFACE-WATER DISPERSION HAVE CAUSED THE SPREAD OF TAILINGS TO PERIPHERAL PROPERTIES, WHILE USE OF THE TAILINGS AS CONSTRUCTION MATERIAL HAS DISTRIBUTED THE TAILINGS TO LOCAL RESIDENTIAL AND COMMERCIAL PROPERTIES. DISPERSION TO NUMEROUS RESIDENCES AND BUSINESSES IN THE CITY OF MONTICELLO HAS RESULTED IN THE IDENTIFICATION AND REMEDIATION OF THE MONTICELLO VICINITY PROPERTIES. THIS SITE WAS INCLUDED ON THE NATIONAL PRIORITIES LIST IN 1986.

HUMAN HEALTH RISKS

RADIOACTIVE CONTAMINANTS

THE TWO MAJOR CONTAMINANTS OF CONCERN FOR THE RADIOLOGICAL PUBLIC HEALTH

ASSESSMENT ARE RADON GAS AND GAMMA RADIATION, BOTH OF WHICH ARE ATTRIBUTABLE TO THE TAILINGS PILES AND THE CONTAMINATED SOILS AND MATERIALS ON THE MILLSITE AND PERIPHERAL PROPERTIES. RADON GAS MIGRATES THROUGH THE TAILINGS INTO THE ATMOSPHERE. GAMMA RADIATION IS EMITTED FROM THE TAILINGS. THE ADVERSE HEALTH EFFECTS OF RADON EMANATION ARISE FROM INHALATION OF THE SHORT-LIVED RADON DAUGHTER PRODUCTS WHICH CAN EXPOSE THE LUNGS TO THEIR FULL RADIATION DOSE. GAMMA RADIATION DELIVERS ITS DOSE TO THE ENTIRE BODY.

FIVE POTENTIAL EXPOSURE PATHWAYS WERE IDENTIFIED:

* INGESTION OF CONTAMINATED FOOD PRODUCED IN AREAS CONTAMINATED BY THE TAILINGS;

* INHALATION AND INGESTION OF AIRBORNE RADIOACTIVE PARTICULATES;

* INGESTION OF SURFACE WATER CONTAMINATED BY THE TAILINGS; INHALATION OF RADON AND RADON DAUGHTERS; AND

* DIRECT EXPOSURE TO GAMMA RADIATION EMITTED FROM THE TAILINGS.

THE FIRST TWO PATHWAYS, WHICH INCLUDE INGESTION OF PLANT MATERIAL "DUSTED" WITH WINDBLOWN TAILINGS, INGESTION OF ANIMAL FOOD PRODUCTS FROM ANIMALS INGESTING SUCH PLANT MATERIAL, INHALATION AND INGESTION OF AIRBORNE PARTICULATES, AND INGESTION OF HOUSEHOLD DUST, ARE CONSIDERED INSIGNIFICANT BECAUSE CONCENTRATIONS OF URANIUM AND RADIUM ASSOCIATED WITH AIRBORNE PARTICULATES ARE BELOW BACKGROUND LEVELS. THE THIRD PATHWAY IS NOT CONSIDERED TO BE A PROBABLE PATHWAY BECAUSE ELEVATED RADIUM CONCENTRATIONS HAVE NOT BEEN DETECTED IN MONTEZUMA CREEK. ELEVATED URANIUM LEVELS HAVE BEEN DETECTED IN OFF-SITE WELLS AND MONTEZUMA CREEK, HOWEVER, URANIUM IS BEING CONSIDERED UNDER NONRADIOLOGICAL RISKS FOR THE FOLLOWING REASONS. FIRST, THE RADIOLOGICAL EXPOSURE DOSE RATE FROM URANIUM IS LOW BECAUSE OF ITS LOW CONCENTRATION IN THE WATER. SECONDLY, URANIUM IS A STRONG NEPHROTOXIN AND BECAUSE IT HAS A VERY LONG HALF-LIFE WILL PERSIST IN THE ENVIRONMENT. THEREFORE, TWO PATHWAYS REMAINED FOR CONSIDERATION: INHALATION OF RADON AND RADON DAUGHTERS, AND DIRECT EXPOSURE TO GAMMA RADIATION.

FOR EACH OF THESE TWO PATHWAYS, THE EXCESS CANCER INCIDENCE TO THE MONTICELLO POPULATION WAS DETERMINED BY MULTIPLYING THE POPULATION DOSE COMMITMENT BY A FACTOR REPRESENTING THE ESTIMATED CANCER RISK PER REM OF EXPOSURE. REM (ROENTGEN EQUIVALENT MAN) IS A UNIT USED TO MEASURE EXPOSURE TO RADIATION WHICH APPLIES QUALITATIVE AND OTHER MODIFYING FACTORS TO ACCOUNT FOR THE PARTICULAR CHARACTER OF THE RADIATION EXPOSURE. POPULATION DOSE COMMITMENT WAS DETERMINED BY MULTIPLYING THE AVERAGE ANNUAL INDIVIDUAL RATE OF EXPOSURE BY THE TOTAL POPULATION; IT IS EXPRESSED IN UNITS OF PERSON-REMS PER YEAR (PERSON-REM/YR). FOR

RADON, AN INDIVIDUAL LUNG CANCER RISK FACTOR OF 20 X (10-6) PER REM, OR 20 EXCESS CANCER DEATHS PER YEAR PER 1 MILLION PERSON-REM, WAS USED. FOR GAMMA RADIATION, A RISK FACTOR OF 120 X (10-6) PER REM WAS USED. THIS FACTOR IS EQUIVALENT TO 120 EXCESS CANCER DEATHS IN AN EXPOSED POPULATION FOR EACH 1 MILLION PERSON-REM OF COLLECTIVE DOSE EQUIVALENT.

FOR THE SCENARIO REPRESENTING INHALATION OF RADON FROM THE MILLSITE AND PERIPHERAL PROPERTIES, THE EXCESS ANNUAL CANCER INCIDENCES TO THE MONTICELLO POPULATION ARE ESTIMATED TO BE 0.38 X (10-2) (OR, 0.0038 EXCESS CANCER INCIDENCES FOR THE MONTICELLO POPULATION). WHOLE BODY EXPOSURE TO GAMMA RADIATION RESULTED IN AN ESTIMATED EXCESS CANCER INCIDENCE OF 2.0 X (10-2) PER YEAR, OR 0.02 EXCESS CANCER INCIDENCES FOR THE ENTIRE MONTICELLO POPULATION ANNUALLY. THE RADIOLOGICAL RISK ASSESSMENT WAS PERFORMED ON A POPULATION BASIS PRIOR TO RECENT EPA GUIDANCE ON PERFORMING RADIOLOGICAL RISK ASSESSMENTS ON AN INDIVIDUAL BASIS.

AS AN INDICATOR OF POTENTIAL INDIVIDUAL RISK DUE TO BASELINE RADIOLOGICAL CONDITIONS, A GROSS ESTIMATE OF THE LIFETIME EXCESS CANCER INCIDENCE TO THE INDIVIDUAL WAS ESTIMATED TO BE 1 X (10-5). ALTHOUGH

THIS ROUGH ESTIMATE IS WITHIN THE ENVIRONMENTAL PROTECTION AGENCY'S ACCEPTABLE RISK RANGE (1 X (10-4) TO 1 X (10-6)) THE MILLSITE WILL STILL BE REMEDIATED TO COMPLY WITH THE PERTINENT HEALTH-BASED APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS IN 40 CFR 192 WHICH REQUIRES REMEDIATION OF URANIUM MILL TAILINGS TO SPECIFIC LEVELS REGARDLESS OF RISK.

NONRADIOACTIVE CONTAMINANTS

A PRELIMINARY SCREENING WAS CONDUCTED TO IDENTIFY THE "HIGHEST RISK", OR INDICATOR, ELEMENTS FOUND ON THE SITE. EXCLUDED FROM CONSIDERATION AS INDICATOR ELEMENTS WERE THOSE ELEMENTS FOUND IN UPGRADIENT SURFACE-WATER AT EQUAL OR HIGHER CONCENTRATIONS THAN THOSE APPEARING ON THE SITE. THOSE ELEMENTS FOUND IN SOIL AND AIR PARTICULATES AT CONCENTRATIONS NOT EXCEEDING BACKGROUND LEVELS WERE ALSO EXCLUDED. THE FOLLOWING ELEMENTS WERE SELECTED AS NONRADIOLOGIC "INDICATOR" ELEMENTS: ARSENIC, COPPER, LEAD, MOLYBDENUM, SELENIUM, URANIUM, VANADIUM, AND ZINC. WITH THE EXCEPTION OF MOLYBDENUM, ALL OF THE ELEMENTS CHARACTERIZED IN THE TAILINGS PILES ARE LISTED AS COMPREHENSIVE ENVIRONMENTAL RESPONSE, COMPENSATION, AND LIABILITY ACT HAZARDOUS SUBSTANCES AT 40 CFR 302.4.

UNDER EXISTING CONDITIONS, THE MAJOR SOURCES OF NONRADIOLOGIC ELEMENTS ARE THE TAILINGS PILES AND MILL PROCESS-RELATED BY-PRODUCT MATERIAL AT THE MILLSITE. NONRADIOLOGICAL CONSTITUENTS IN THE TAILINGS PILES CAN BE LEACHED FROM THE TAILINGS AND RELEASED INTO OTHER ENVIRONMENTAL MEDIA. CONTAMINANTS MAY BE TRANSPORTED OR RELEASED FROM THE TAILINGS PILE INTO THE GROUND WATER, SURFACE WATER, AND AIR. TOXIC ELEMENTS ARE LEACHED FROM THE TAILINGS INTO THE SHALLOW ALLUVIAL AQUIFER.

POTENTIAL EXPOSURE PATHWAYS WERE DEVELOPED BASED ON THE POPULATIONS AND ACTIVITY PATTERNS IN THE VICINITY OF THE URANIUM MILL TAILINGS SITE. THESE PATHWAYS ARE:

* INHALATION OF RESUSPENDED DUST;
* INGESTION OF CONTAMINATED SOIL;
* INGESTION OF CONTAMINATED VEGETABLES; AND
* INGESTION OF CONTAMINATED BEEF.

THE FIRST PATHWAY, INHALATION OF RESUSPENDED DUST, WAS EXCLUDED FROM FURTHER CONSIDERATION BECAUSE MONITORED PARTICULATE CONCENTRATIONS INDICATED THAT THE LEVELS WERE NOT ELEVATED ABOVE BACKGROUND. FURTHER, SEVERAL NONRADIOLOGIC ELEMENTS WERE ANALYZED FOR IN THE PARTICULATE SAMPLES OBTAINED. LEAD IS THE ONLY NONRADIOACTIVE AIRBORNE PARTICULATE MEASURED AT THE MILLSITE THAT IS REGULATED BY A SPECIFIC STANDARD. ACCEPTABLE AIRBORNE LEVELS OF THIS ELEMENT ARE DEFINED BY THE ENVIRONMENTAL PROTECTION AGENCY UNDER THE NATIONAL AMBIENT AIR QUALITY STANDARDS. THE STANDARD SPECIFIES THAT A 3-MONTH AVERAGE CONCENTRATION OF LEAD IS NOT TO EXCEED 1.5 UG/M(3). THE MAXIMUM CONCENTRATION MEASURED AT THE SITE IS 0.0490 UG/M(3), WELL BELOW THE COMPLIANCE

STANDARD.

THE SECOND PATHWAY, INGESTION OF CONTAMINATED SOIL, WAS ALSO EXCLUDED FROM THE ASSESSMENT BECAUSE ALTHOUGH LIMITED ENTRY MAY OCCUR AT THE MILLSITE, THE FREQUENCY IS VERY LOW DUE TO EXISTING FENCES. THE CHANCE THAT A TRESPASSER WOULD INGEST CONTAMINATED SOIL IS LOW BECAUSE INGESTION IS ASSOCIATED PREDOMINANTLY WITH VERY SMALL CHILDREN. FURTHER, THE EXISTING SOIL COVER SERVES AS AN ADDITIONAL BARRIER TO INGESTION OF THE TAILINGS MATERIAL, WHICH CONTAINS THE GREATEST CONCENTRATION OF NONRADIOLOGICAL CONSTITUENTS.

THE POTENTIAL FUTURE RISK FOR THE SOIL INGESTION PATHWAY HAS BEEN QUALITATIVELY ESTIMATED, ALTHOUGH THE POTENTIAL FOR THE ACCESS CONTROLS CURRENTLY USED BY THE DEPARTMENT OF ENERGY TO BE REMOVED IN THE FUTURE IS EXTREMELY LOW. THE DEPARTMENT OF ENERGY HAS STRICT REQUIREMENTS FOR CONTROLLING RADIOACTIVELY CONTAMINATED SITES, WHICH DO NOT ALLOW SITES TO BE RELEASED FOR UNRESTRICTED USE UNLESS RADIATION LEVELS ARE WITHIN ACCEPTABLE LIMITS. IT IS HIGHLY UNLIKELY THAT THE DEPARTMENT OF ENERGY, OR OTHER SUCCESSOR FEDERAL AGENCY, WOULD LOOSEN THIS POLICY FOR A CONTAMINATED SITE. HOWEVER, UNDER A FUTURE RISK SCENARIO, IT IS ANTICIPATED THAT RISKS TO THE EXPOSED POPULATION WILL BE MINIMAL BECAUSE OF A LOW EXPOSURE FREQUENCY DUE TO THE AREA'S SPARSE POPULATION. ALSO, THE EXPOSURE DOSE WILL BE LOW (UNDER 60 MG/DAY) BECAUSE ONLY OLDER, UNSUPERVISED CHILDREN ARE LIKELY TO ENTER THIS AREA. THEREFORE, ASSUMING IT IS POSSIBLE TO ENTER THE SITE UNDER A FUTURE SCENARIO, RISKS ASSOCIATED WITH NONRADIOACTIVE CONTAMINANTS THROUGH THE SOIL INGESTION PATHWAY SHOULD BE NEGLIGIBLE.

PATHWAYS (3) AND (4) WERE RETAINED FOR CONSIDERATION. THEY ARE CONSIDERED TO BE INDIRECT EXPOSURE ROUTES RESULTING FROM CONTAMINATED

SURFACE WATER IN THE AREA, USED TO IRRIGATE FIELDS AND WATER LIVESTOCK. CONTAMINANTS IN THE WATER CAN ENTER THE FOOD CHAIN THROUGH THE INGESTION OF CONTAMINATED VEGETABLES AND BEEF.

NONCARCINOGENIC HEALTH EFFECTS CAN ARISE FROM ACUTE AND CHRONIC EXPOSURES TO ALL EIGHT ELEMENTS. REFERENCE DOSES HAVE BEEN DEVELOPED BY THE ENVIRONMENTAL PROTECTION AGENCY TO INDICATE THE POTENTIAL FOR ADVERSE HEALTH EFFECTS FROM EXPOSURE TO CHEMICALS EXHIBITING NONCARCINOGENIC EFFECTS (E.G., PERSISTENT NEUROLOGICAL EFFECTS, NEUROTOXICITY, RESPIRATORY PROBLEMS, SKIN RASHES). A REFERENCE DOSE IS AN ESTIMATE OF A LIFETIME DAILY EXPOSURE LEVEL (SPECIFIC TO A PARTICULAR EXPOSURE ROUTE) FOR HUMANS, INCLUDING SENSITIVE INDIVIDUALS, WHICH IS UNLIKELY TO RESULT IN AN APPRECIABLE RISK OF DELETERIOUS (ADVERSE) EFFECTS DURING A LIFETIME.(A) ESTIMATED INTAKES OF CHEMICALS FROM ENVIRONMENTAL MEDIA (E.G. THE AMOUNT OF A CHEMICAL INGESTED FROM CONTAMINATED DRINKING WATER) CAN BE COMPARED TO THE REFERENCE DOSE (OR ACCEPTABLE INTAKE FOR CHRONIC EXPOSURE). BOTH PARAMETERS ARE EXPRESSED IN UNITS OF MILLIGRAM PER KILOGRAM-DAY (MG/KG DAY).

INTAKE ESTIMATES OF EACH INDICATOR ELEMENT WERE COMPUTED FOR THE

POTENTIAL EXPOSURE PATHWAYS FOR BOTH CHILDREN AND ADULTS. MAXIMUM AND AVERAGE SOIL CONCENTRATIONS WERE USED IN EXPOSURE DOSE CALCULATIONS. TOTAL ORAL INTAKE FOR THE CONTAMINATED VEGETABLE AND CONTAMINATED BEEF PATHWAYS WERE THEN COMPARED WITH THE ACCEPTABLE INTAKES FOR CHRONIC EXPOSURE.

(A) THE ORIGINAL RISK ASSESSMENT USED "ACCEPTABLE INTAKES FOR CHRONIC EXPOSURE" INSTEAD OF REFERENCE DOSES. ACCEPTABLE INTAKES FOR CHRONIC EXPOSURE AND REFERENCE DOSES ARE SIMILAR IN CONCEPT, BUT REFERENCE DOSES ARE DERIVED USING A MORE STRICTLY DEFINED METHODOLOGY. ACCEPTABLE INTAKES FOR CHRONIC EXPOSURE WERE RECOMMENDED BY THE ENVIRONMENTAL PROTECTION AGENCY WHEN THE ORIGINAL RISK ASSESSMENT WAS PREPARED, BUT THE ENVIRONMENTAL PROTECTION AGENCY NOW RECOMMENDS THE USE OF REFERENCE DOSES. THEREFORE, THIS TERMINOLOGY HAS BEEN USED IN THIS DISCUSSION.

EXPOSURES WERE THEN CALCULATED FOR THE TWO EXPOSURE SCENARIOS RETAINED FOR CONSIDERATION. COMPARISON OF EXISTING CONTAMINANT CONCENTRATIONS WITH THE ACCEPTABLE INTAKES FOR CHRONIC EXPOSURE RESULTED IN NO APPARENT HEALTH RISK. WHEN AVERAGE CONCENTRATIONS OF CONTAMINANTS IN SOIL WERE USED, NONE OF THE DOSE LEVELS WERE EXCEEDED. COPPER, URANIUM (INCLUDING THE VEGETABLE PATHWAY) AND ZINC (INCLUDING OR EXCLUDING THE VEGETABLE PATHWAY) EXCEEDED RECOMMENDED LEVELS FOR CHILDREN WHEN MAXIMUM SOIL CONCENTRATIONS WERE USED. HOWEVER, BECAUSE THE MILLSITE IS UNINHABITED, AND CONSIDERING HISTORICAL LAND USE PATTERNS IN THE AREA, IT IS UNLIKELY THAT INDIVIDUALS WOULD RECEIVE CHRONIC EXPOSURE TO THESE MAXIMUM CONCENTRATIONS. BECAUSE AVERAGE EXPOSURE DOSES DO NOT EXCEED THE ACCEPTABLE INTAKES FOR CHRONIC EXPOSURE, USE OF SURFACE WATER TO IRRIGATE PASTURE OR ALFALFA, ON WHICH CATTLE GRAZE, APPEARS TO BE ACCEPTABLE.

ARSENIC IS THE ONLY INDICATOR CHEMICAL THAT IS CONSIDERED TO BE A HUMAN CARCINOGEN. ACCORDING TO THE ENVIRONMENTAL PROTECTION AGENCY WEIGHT-OF-EVIDENCE CLASSIFICATION SYSTEM FOR CARCINOGENICITY, ARSENIC IS INCLUDED IN GROUP A, MEANING IT IS A CONFIRMED HUMAN CARCINOGEN. THE SLOPE FACTORS (ANALOGOUS TO CANCER RISK FACTORS FOR RADIOLOGIC CONTAMINANTS) FOR ARSENIC FOR THE INHALATION AND INGESTION EXPOSURE PATHWAYS ARE 50 (MG/KG/DAY)(-1) AND 1.5 (MG/KG/DAY)(-1), RESPECTIVELY.

EXCESS LIFETIME CANCER RISKS DUE TO EXPOSURE FROM ARSENIC LEVELS AT THE MILLSITE, FOR PATHWAYS 3 AND 4, WERE DETERMINED BY MULTIPLYING THE INTAKE LEVEL BY THE SLOPE FACTOR. CALCULATED CANCER RISKS FROM ARSENIC CONTAMINATION ARE WITHIN THE HEALTH GOAL RANGE OF 1 X (10-4) TO 1 X (10-6) LIFETIME CANCER RISK. THIS RANGE HAS A POINT OF DEPARTURE AT 1 X (10-6). AN EXCESS LIFETIME CANCER RISK OF 1 X (10-6) INDICATES THAT, AS A PLAUSIBLE UPPER BOUND, AN INDIVIDUAL HAS A ONE IN ONE MILLION CHANCE OF DEVELOPING CANCER AS A RESULT OF SITE-RELATED EXPOSURE TO A CARCINOGEN OVER A 70-YEAR LIFETIME UNDER THE ATTRIBUTABLE TO THE MILLSITE FOR AN INDIVIDUAL DUE TO INGESTION OF CONTAMINATED VEGETABLES IS 2.7 X (10-5), OR 2.7 CANCERS IN 100,000 PEOPLE EXPOSED, USING MAXIMUM SOIL CONCENTRATIONS; AND 7.0 X (10-6) (OR 7 CANCERS IN 1,000,000 PEOPLE

EXPOSED) FOR AVERAGE SOIL CONCENTRATIONS ABOVE BACKGROUND. CANCER RISKS FOR ARSENIC ATTRIBUTABLE TO THE MILLSITE FOR AN INDIVIDUAL DUE TO INGESTION OF CONTAMINATED BEEF IS 2.0 X (10-5) (OR 2 CANCERS PER 100,000 PEOPLE EXPOSED) USING MAXIMUM SOIL CONCENTRATIONS AND 2.0 X (10-6) (OR 2 CANCERS PER 1,000,000 PEOPLE EXPOSED) USING AVERAGE SOIL CONCENTRATIONS ABOVE BACKGROUND. ON THE BASIS OF THIS INFORMATION, ARSENIC MAY POSE A PUBLIC HEALTH IMPACT UNDER THE EXISTING CONDITIONS AT THE MILLSITE.

ENVIRONMENTAL RISKS

RISKS TO THE NATURAL ENVIRONMENT THAT WERE CONSIDERED IN THE REMEDIAL INVESTIGATION/FEASIBILITY STUDY ARE ALSO ADDRESSED IN THIS RECORD OF DECISION. SPECIFIC ENVIRONMENTAL CONCERNS AT THE MILLSITE AND ON PERIPHERAL PROPERTIES INCLUDE IMPACTS TO ARCHAEOLOGY, VEGETATION, WILDLIFE, FISHERIES, AND FLOODPLAIN/WETLANDS.

AN INVENTORY OF THE LOWER MONTEZUMA CREEK DRAINAGE IDENTIFIED ONE HISTORIC SITE ON THE FLOODPLAIN AND NUMEROUS PREHISTORIC SITES ALONG THE WALLS OF THE CANYON. THE HISTORIC SITE WAS FIELD-EVALUATED AS NONSIGNIFICANT. SEVERAL OF THE PREHISTORIC SITES WERE FIELD-EVALUATED AS SIGNIFICANT BECAUSE THEY ARE LIKELY TO POSSESS UNDISTURBED STRATIFIED CULTURAL DEPOSITS; DETERMINATIONS OF THESE SITES' ELIGIBILITY FOR THE NATIONAL REGISTER OF HISTORIC PLACES MUST BE MADE PRIOR TO THEIR DISTURBANCE, AND WILL BE DEALT WITH UNDER OPERABLE UNIT III.

THREATENED OR ENDANGERED PLANT SPECIES WERE NOT ENCOUNTERED DURING THE REMEDIAL INVESTIGATION, ALTHOUGH THE AREA IS WITHIN THE POTENTIAL RANGE OF TWO SPECIES OF CACTI, ONE OF WHICH IS LISTED AS THREATENED AND ONE OF WHICH IS LISTED AS ENDANGERED BY THE US FISH AND WILDLIFE SERVICE. NO PLANTS OF STATE CONCERN WERE FOUND IN THE AREA.

ACCORDING TO THE US FISH AND WILDLIFE SERVICE, NO THREATENED OR ENDANGERED AVIAN SPECIES OCCUR AT OR NEAR THE MONTICELLO MILLSITE, ALTHOUGH THE ENDANGERED AMERICAN PEREGRINE FALCON AND THE THREATENED BALD EAGLE COULD OCCUR IN THE AREA. USE OF THE MILLSITE BY EITHER SPECIES IS CONSIDERED REMOTE BECAUSE OF THE LACK OF ARBOREAL VEGETATION.

FISHERY SPECIES OF CONCERN WHICH OCCUR IN THE SAN JUAN RIVER APPROXIMATELY 30 MILES SOUTH OF THE MILLSITE INCLUDE THE COLORADO SQUAWFISH, THE RAZORBACK SUCKER, AND THE ROUNDTAIL CHUB. IN THE UPPER REACHES OF MONTEZUMA CREEK WHERE SAMPLING OCCURRED, NO FISH WERE FOUND. THE PRINCIPAL REASON FOR THIS IS THOUGHT TO BE THE SEASONAL DEWATERING OF THE CREEK, ESPECIALLY PRIOR TO 1986. PRESENT STREAM CONDITIONS IN THE LOWER CREEK INDICATE DEEP POOLS WITH COVER THAT COULD SUPPORT A FISHERY.

THE US ARMY CORPS OF ENGINEERS PERFORMED A WETLANDS ASSESSMENT IN AUGUST 1989. IT WAS DETERMINED THAT MONTEZUMA CREEK AND ADJACENT WETLANDS AREAS CONSTITUTE 18.63 ACRES OF WETLANDS, BEGINNING AT HIGHWAY 191 AND ENDING AT THE CREEK'S CONFLUENCE WITH VEGA CREEK.

#DA
DESCRIPTION OF ALTERNATIVES

REMEDIAL ACTION ALTERNATIVES IN THE FEASIBILITY STUDY REPORT WERE EVALUATED IN ACCORDANCE WITH THE COMPREHENSIVE ENVIRONMENTAL RESPONSE, COMPENSATION, AND LIABILITY ACT, AS AMENDED BY THE SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT, AND THE NATIONAL CONTINGENCY PLAN. PRIOR TO EVALUATING REMEDIAL ACTION ALTERNATIVES, SEVERAL PRELIMINARY EVALUATIONS OCCURRED. REMEDIAL ACTION OBJECTIVES WERE IDENTIFIED ON THE BASIS OF THE MILLSITE CHARACTERIZATION RESULTS. RESPONSE ACTIONS AND ASSOCIATED TECHNOLOGIES WERE CONSIDERED AND SCREENED FOR EACH OPERABLE UNIT. THE TECHNOLOGY SCREENING ACTIVITIES WERE BASED ON RELATIVE EFFECTIVENESS, IMPLEMENTABILITY, AND COST. PRELIMINARY REMEDIAL ACTION ALTERNATIVES WERE THEN DEVELOPED FROM THE REMAINING TECHNOLOGY PROCESS OPTIONS. THE CONCEPT OF OPERABLE UNITS WAS UTILIZED TO DIFFERENTIATE CONTAMINATED MEDIA AND TO PROVIDE A MECHANISM FOR DEVELOPING AND EVALUATING ALTERNATIVES FOR EACH MEDIA. ALTERNATIVES WERE DEVELOPED RANGING FROM THOSE ELIMINATING THE NEED FOR LONG-TERM MANAGEMENT, TO ALTERNATIVES INVOLVING TREATMENT THAT WOULD PERMANENTLY REDUCE THE MOBILITY, TOXICITY, OR VOLUME OF THE HAZARDOUS SUBSTANCES AS THEIR PRINCIPAL ELEMENT. CONTAINMENT OPTIONS WERE ALSO DEVELOPED.

DURING THE PRELIMINARY REMEDIAL ACTION ALTERNATIVES ANALYSIS, SEVERAL POTENTIAL OPTIONS WERE DROPPED. CHEMICAL/PHYSICAL TREATMENT OF THE TAILINGS WAS ELIMINATED DUE TO HIGH COST (I.E., LIME STABILIZATION) FOR TREATMENT OF ALL CONSTITUENTS, AND POOR IMPLEMENTABILITY BECAUSE OF UNPROVEN TECHNOLOGIES (I.E., IN-SITU VITRIFICATION). DISPOSING OF THE TAILINGS IN A REPOSITORY BUILT AT THE TAILINGS PILES' CURRENT LOCATION

WAS ELIMINATED DUE TO THE INABILITY TO MEET RELEVANT AND APPROPRIATE REQUIREMENTS, SPECIFICALLY 40 CFR 192, WHICH PLACES SEVERE LIMITS ON DISPOSAL SITES PLACED IN CONTACT WITH GROUND WATER. THE TAILINGS WOULD HAVE TO BE REMOVED, A LINER INSTALLED, AND THE TAILINGS REPLACED. COST, DECONTAMINATION DIFFICULTIES, AND QUESTIONS ON LONGEVITY AND LINER EFFECTIVENESS MADE THIS OPTION INEFFECTIVE, LESS PROTECTIVE OF HUMAN HEALTH AND THE ENVIRONMENT, AND DIFFICULT TO IMPLEMENT.

SEVEN POTENTIAL OFF-SITE REPOSITORY LOCATIONS WITHIN 12 TO 45 MILES OF THE SITE WERE ALSO EVALUATED DURING THE PRELIMINARY SCREENING PROCESS FOR EFFECTIVENESS, IMPLEMENTABILITY, AND COST. SITING CRITERIA WERE ESTABLISHED BASED ON 40 CFR 192 AND EACH POTENTIAL SITE WAS EVALUATED AGAINST THESE CRITERIA.

BASED ON THE SCREENING PROCESS, THE HIGHWAY 95 SITE WAS SELECTED AS THE MOST SUITABLE OF THESE SITES AND WAS KEPT FOR FURTHER EVALUATION IN THE FEASIBILITY STUDY. THIS LOCATION WAS ULTIMATELY ELIMINATED DURING THE DETAILED ANALYSIS OF ALTERNATIVES BECAUSE OF IMPLEMENTABILITY AND COST. THE SITE WAS VERY SIMILAR IN MOST RESPECTS TO THE "EXISTING OFF-SITE REPOSITORY" ALTERNATIVE (WHICH WAS RETAINED AS A REMEDIAL ACTION

ALTERNATIVE) EXCEPT THAT THE HIGHWAY 95 SITE CONSISTED OF UNDISTURBED LAND. THE POTENTIAL FOR IMPACT TO ENVIRONMENTAL AND HISTORICAL RESOURCES, AND OTHER PERTINENT REQUIREMENTS WOULD MAKE THIS ALTERNATIVE MORE DIFFICULT TO IMPLEMENT THAN REMOVAL TO AN EXISTING OFF-SITE REPOSITORY. THE LACK OF EXISTING IMPROVEMENTS ON THE HIGHWAY 95 SITE ALSO LED TO INCREASED COSTS. THE OTHER SIX SITES EXHIBITED SUBSTANTIALLY HIGHER POTENTIALS FOR WIND AND WATER EROSION, FLOODING, AND LANDSLIDES THAN DID THE SITES RETAINED FOR DETAILED ANALYSIS. OTHER PROBLEMS EXHIBITED BY THE ELIMINATED SITES INCLUDE GROUND WATER CONCERNS, ENDANGERED SPECIES CONSIDERATIONS, AND THE ABILITY TO MEET DESIGN LONGEVITY STANDARDS FOR THE REPOSITORY.

OPERABLE UNIT I -- MILL TAILINGS AND MILLSITE PROPERTY

OPERABLE UNIT I INCLUDES APPROXIMATELY 1.5 MILLION CUBIC YARDS OF URANIUM MILL TAILINGS, ORE, BY-PRODUCT MATERIAL, CONTAMINATED BUILDING MATERIALS, AND MILL EQUIPMENT EXISTING ON THE MILLSITE.

THREE REMEDIAL ACTION ALTERNATIVES WERE RETAINED FOR DETAILED DEVELOPMENT AND ANALYSIS FOR THIS OPERABLE UNIT. THEY ARE NO ACTION, REMOVAL OF TAILINGS AND TRANSPORT TO A LICENSED REPOSITORY, AND REMOVAL OF TAILINGS WITH DISPOSAL IN A REPOSITORY ON SITE, SOUTH OF THE PRESENT LOCATION. A DISCUSSION OF EACH ALTERNATIVE FOLLOWS:

ALTERNATIVE 1: NO ACTION

THE NO-ACTION ALTERNATIVE PROVIDES A BASELINE WITH WHICH TO COMPARE OTHER ALTERNATIVES AND INVOLVES PERFORMING NO REMEDIAL ACTION, WHILE CONTINUING MONITORING ACTIVITIES. INSTITUTIONAL CONTROLS ARE LIKELY TO BE IN PLACE DUE TO THEIR CURRENT EXISTENCE AND THE DEPARTMENT OF

ENERGY'S PHILOSOPHY OF RESTRICTED ACCESS FOR CONTAMINATED AREAS. THIS ALTERNATIVE WOULD RESULT IN CONTINUED CONTAMINATION OF THE ALLUVIAL AQUIFER AND MONTEZUMA CREEK. LEAVING THE TAILINGS IN THEIR PRESENT CONDITION WOULD SUBJECT THEM TO DISPERSAL BY WATER AND WIND AND WOULD CONTINUE TO PREVENT BENEFICIAL USE OF CONTAMINATED AREAS. EXPOSURE LEVELS (AND THEREFORE, HEALTH RISKS) COULD INCREASE SIGNIFICANTLY IF LAND USE WERE TO CHANGE, OR IF UNCONTROLLED REMOVAL OF THE WASTES WERE TO OCCUR.

ALTERNATIVE 2: REMOVAL OF TAILINGS AND TRANSPORT TO A LICENSED REPOSITORY

THIS ALTERNATIVE INVOLVES EXCAVATION AND REMOVAL OF CONTAMINATED MATERIALS TO AN OFF-SITE LICENSED REPOSITORY. THE DISPOSAL CELL WOULD MEET THE CURRENT DESIGN AND OPERATION REQUIREMENTS OF THE NUCLEAR REGULATORY COMMISSION OR RELEVANT STATE AGENCY. SINCE REMEDIATION OF THE MONTICELLO SITE IS A COMPREHENSIVE ENVIRONMENTAL RESPONSE, COMPENSATION, AND LIABILITY ACT ACTION, ENVIRONMENTAL PROTECTION AGENCY DESIGN CRITERIA AT 40 CFR PART 192 WOULD BE RELEVANT AND APPROPRIATE REQUIREMENTS FOR THE REPOSITORY.

ALL TAILINGS, MILLING PROCESS BY-PRODUCT MATERIAL, AND CONTAMINATED BUILDING AND EQUIPMENT MATERIAL FROM THE MILLSITE WOULD BE RELOCATED TO THE SITE BY TRUCK TRANSPORTATION ON HIGHWAYS.

ALTERNATIVE 3: REMOVAL OF TAILINGS AND DISPOSAL IN A REPOSITORY ON SITE, SOUTH OF THE PRESENT LOCATION

THIS ALTERNATIVE INVOLVES EXCAVATION AND REMOVAL OF CONTAMINATED MATERIALS TO AN ON-SITE REPOSITORY SITE LOCATED SOUTH OF THE EXISTING MILLSITE. REMOVAL OF THE TAILINGS, BY-PRODUCT MATERIAL, AND CONTAMINATED BUILDING AND EQUIPMENT MATERIAL WOULD PREVENT FUTURE CONTAMINATION OF AIR, SURFACE SOIL, AND GROUND WATER AS PRESENTED IN THE PREVIOUS ALTERNATIVE. REMOVAL WOULD BE BY CONVENTIONAL EARTHMOVING EQUIPMENT. TRANSPORT OF TAILINGS AND OTHER MATERIALS WOULD BE ENTIRELY ON SITE. DUST-CONTROL MEASURES AND ACCESS RESTRICTIONS WOULD BE USED TO PROTECT PUBLIC HEALTH DURING REMEDIAL ACTION ACTIVITIES. TO CONTROL RUNOFF, DIVERSION STRUCTURES WOULD BE BUILT WITH COLLECTED WATER TREATED BY EVAPORATION PONDS, REVERSE OSMOSIS, OR OTHER APPROPRIATE TECHNOLOGIES TO BE DETERMINED DURING THE DESIGN PROCESS. TREATED WATER WOULD BE DISCHARGED TO MONTEZUMA CREEK IN ACCORDANCE WITH THE APPLICABLE REGULATIONS (CLEAN WATER ACT, UTAH POLLUTION DISCHARGE ELIMINATION SYSTEM, AND OTHER REGULATORY REQUIREMENTS), OR USED FOR COMPACTION OR DUST CONTROL PURPOSES. CONTAMINATED RESIDUALS FROM EITHER OF THE TREATMENT SYSTEMS WOULD BE DISPOSED OF IN THE NEW REPOSITORY OR AT A LICENSED REPOSITORY. TAILINGS DISPOSAL WOULD OCCUR ON LAND CONTIGUOUS TO THE EXISTING MILLSITE IN A REPOSITORY COVERED WITH A CLAY AND MULTIMEDIA CAP. THIS REPOSITORY WOULD BE DESIGNED TO COMPLY WITH 40 CFR 192 PERFORMANCE STANDARDS. THE LAND IS NOT CURRENTLY OWNED BY THE DEPARTMENT OF ENERGY AND WOULD HAVE TO BE ACQUIRED. THE ENVIRONMENTAL

PROTECTION AGENCY, IN ACCORDANCE WITH THE NATIONAL CONTINGENCY PLAN, HAS DETERMINED THAT THE PROPOSED LOCATION OF THE REPOSITORY MEETS THE CRITERIA FOR BEING CONSIDERED "ON SITE".

OPERABLE UNIT II -- PERIPHERAL PROPERTIES

OPERABLE UNIT II INCLUDES APPROXIMATELY 300,000 CUBIC YARDS OF RADIOACTIVELY CONTAMINATED SOILS CARRIED BY WIND OR WATER FROM THE MILLSITE, AND MILL PROCESSING BY-PRODUCT MATERIAL LOCATED ON PERIPHERAL PROPERTIES.

TWO REMEDIAL ACTION ALTERNATIVES, RETAINED FOR DETAILED DEVELOPMENT AND ANALYSIS FOR THIS OPERABLE UNIT, ARE DESCRIBED IN THE FOLLOWING SUBSECTIONS: NO ACTION, AND CLEAN UP TO 40 CFR 192.12 STANDARDS, WHICH INCLUDES PLACEMENT OF CONTAMINATED MATERIAL IN A REPOSITORY WITH THE MILLSITE TAILINGS. THIS ALTERNATIVE ALSO ALLOWS THE OPPORTUNITY FOR THE DEPARTMENT OF ENERGY TO APPLY FOR SUPPLEMENTAL STANDARDS UNDER 40 CFR 192 AT SPECIFIC PROPERTIES.

ALTERNATIVE 1: NO ACTION

THIS ALTERNATIVE WOULD LEAVE CONTAMINATED PERIPHERAL PROPERTIES ALONE, WITH NO REMEDIATION BEING PERFORMED. IN CONTRAST WITH THE NO-ACTION ALTERNATIVE FOR OPERABLE UNIT I, INSTITUTIONAL CONTROLS ARE NOT CURRENTLY IN PLACE BECAUSE PROPERTIES ARE NOT UNDER THE DEPARTMENT OF ENERGY'S CONTROL. THE NO-ACTION ALTERNATIVE PROVIDES A BASELINE WITH WHICH TO COMPARE THE OTHER REMEDIAL ACTION ALTERNATIVES.

ALTERNATIVE 2: CLEAN UP TO 40 CFR 192.12 STANDARDS

PERIPHERAL PROPERTIES WILL BE CLEANED UP TO THE PRINCIPAL RELEVANT AND APPROPRIATE STANDARD, 40 CFR 192. CONTAMINATED MATERIALS WILL BE TRANSPORTED TO THE EXISTING MILLSITE AND WILL BE RELOCATED WITH THE MILLSITE MATERIALS TO THE REPOSITORY LOCATION CHOSEN FOR OPERABLE UNIT I.

REMOVAL OF CONTAMINATED MATERIALS WILL BE EITHER BY CONVENTIONAL CONSTRUCTION TECHNIQUES OR BY ENVIRONMENTALLY SENSITIVE REMOVAL TECHNIQUES. CONVENTIONAL CONSTRUCTION UTILIZES LARGE EARTHMOVING EQUIPMENT TO REMEDIATE THE PROPERTIES BY REMOVING THE CONTAMINATED SOIL AND MATERIALS. SOIL REMOVED WOULD BE REPLACED WITH CLEAN MATERIAL AND THE SITE WOULD BE REVEGETATED. ALTHOUGH ALL MEANS WOULD BE ATTEMPTED TO REVEGETATE THE AREA TO ITS PRESENT CONDITION, IT WILL TAKE SEVERAL YEARS TO RE-ESTABLISH THE NATIVE BUSHES AND DECADES TO RE-ESTABLISH THE NATIVE TREE SPECIES.

IN AREAS WITH MATURE DENSE VEGETATION, ENVIRONMENTALLY SENSITIVE CONSTRUCTION TECHNIQUES, SUCH AS HAND EXCAVATION, COULD BE USED SUCCESSFULLY TO REMOVE THE CONTAMINATED SOILS, YET MINIMIZE ENVIRONMENTAL DAMAGE TO AREAS THAT ARE IMPORTANT WILDLIFE HABITATS. AN

OPTION TO HAND EXCAVATION WOULD BE THE USE OF HIGH-SUCTION VACUUM EQUIPMENT SPECIFICALLY DESIGNED FOR REMEDIATING HAZARDOUS WASTE SPILLS. THIS EQUIPMENT HAS COSTS SIMILAR TO HAND EXCAVATION, BUT WOULD TEND TO CLEAN UP MORE PRECISELY THE ACTUAL AREAS OF CONTAMINATION. OTHER ENVIRONMENTALLY SENSITIVE CONSTRUCTION TECHNIQUES WOULD BE CONSIDERED.

FIGURE 7-1 SHOWS THE PERIPHERAL PROPERTIES CURRENTLY IDENTIFIED, WITH THE EXCEPTION OF UPPER AND LOWER MONTEZUMA CANYON (DESIGNATED H-SS AND I-SS), WHICH ARE LOCATED FURTHER DOWNSTREAM ON MONTEZUMA CREEK. REMEDIATION OF THESE TWO PROPERTIES WILL BE ADDRESSED IN THE RECORD OF DECISION FOR OPERABLE UNIT III FOLLOWING REMEDIATION OF OPERABLE UNITS I AND II. THE ENVIRONMENTAL PROTECTION AGENCY AND STATE OF UTAH HAVE AGREED THAT SUPPLEMENTAL STANDARDS APPLICATIONS UNDER 40 CFR 192 WILL BE CONSIDERED FOR THESE TWO PROPERTIES. USE OF SUPPLEMENTAL STANDARDS MAY ALLOW NO CLEAN UP OR CLEAN UP TO A LESSER STANDARD THAN 40 CFR 192.12 IF FULL REMEDIATION WOULD CAUSE UNDUE DIRECT ENVIRONMENTAL DAMAGE IN COMPARISON TO THE DERIVED HEALTH BENEFITS.

THE DEPARTMENT OF ENERGY, THE ENVIRONMENTAL PROTECTION AGENCY, AND THE STATE OF UTAH HAVE AGREED THAT THE DENSELY VEGETATED HILLSIDE

PROPERTIES, DESIGNATED B-SS, LOCATED ON THE NORTH SIDE OF MONTEZUMA CREEK WILL BE REMEDIATED TO THE 40 CFR 192.12 STANDARDS USING CONVENTIONAL OR ENVIRONMENTALLY SENSITIVE CONSTRUCTION TECHNIQUES. THESE SIX PROPERTIES HAD PREVIOUSLY BEEN PROPOSED FOR SUPPLEMENTAL STANDARDS APPLICATION UNDER 40 CFR 192. THE ENVIRONMENTAL PROTECTION AGENCY AND THE STATE OF UTAH HAVE AGREED TO CONSIDER APPLICATIONS FOR THE USE OF SUPPLEMENTAL STANDARDS ON DENSELY VEGETATED HILLSIDE PROPERTIES ON THE SOUTH SIDE OF MONTEZUMA CREEK, DESIGNATED B-SS, AND THE MONTICELLO CEMETERY (F-SS). APPLICATION SUBMITTAL AND EVALUATION WILL OCCUR DURING REMEDIAL DESIGN.

#CAA
COMPARATIVE ANALYSIS OF ALTERNATIVES

THE FOLLOWING DISCUSSION SUMMARIZES THE ALTERNATIVES EVALUATION IDENTIFIED IN THE FEASIBILITY STUDY. THE ALTERNATIVES WERE EVALUATED ON THE BASIS OF NINE KEY CRITERIA THAT DIRECTLY RELATE TO THE FACTORS THAT THE COMPREHENSIVE ENVIRONMENTAL RESPONSE, COMPENSATION, AND LIABILITY ACT MANDATES FOR ASSESSMENT WHEN SELECTING A REMEDY. THESE CRITERIA ARE:

(1) OVERALL PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT;
(2) COMPLIANCE WITH APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (DETAILED IN SECTION 10.0);
(3) USE OF TREATMENT TO ACHIEVE A REDUCTION IN THE TOXICITY, MOBILITY, OR VOLUME OF THE CONTAMINANTS;
(4) LONG-TERM EFFECTIVENESS AND PERMANENCE IN PROTECTING HUMAN HEALTH AND THE ENVIRONMENT;
(5) SHORT-TERM EFFECTIVENESS IN PROTECTING HUMAN HEALTH AND

THE ENVIRONMENT;
(6) IMPLEMENTABILITY;
(7) COST;
(8) STATE ACCEPTANCE; AND
(9) COMMUNITY ACCEPTANCE.

CRITERIA 1 AND 2 ARE THRESHOLD CRITERIA, RELATING DIRECTLY TO STATUTORY FINDINGS THAT MUST ULTIMATELY BE MADE IN THIS RECORD OF DECISION. THESE CRITERIA MUST BE MET BY THE CHOSEN REMEDIAL ACTION ALTERNATIVES. CRITERIA 3, 4, 5, 6, AND 7 ARE CONSIDERED PRIMARY BALANCING CRITERIA THAT REPRESENT TECHNICAL, COST, INSTITUTIONAL, AND RISK CONCERNS. THE FINAL TWO CRITERIA ARE MODIFYING CRITERIA AND ARE USED WITHIN AN ALTERNATIVE TO ALTER ACTIVITIES BASED ON STATE AND LOCAL CONCERNS. THE COMPARATIVE ANALYSIS OF ALTERNATIVES FOR OPERABLE UNITS I AND II ARE SUMMARIZED IN TABLES 8-1 AND 8-2, RESPECTIVELY.

OPERABLE UNIT I -- MILL TAILINGS AND MILLSITE PROPERTY

PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT

ALTERNATIVE 1, NO-ACTION, FAILS TO PROTECT HUMAN HEALTH AND THE ENVIRONMENT BECAUSE IT DOES NOT CONTROL EXPOSURE PATHWAYS. CONTAMINATION OF THE ALLUVIAL AQUIFER AND MONTEZUMA CREEK WOULD CONTINUE, AND TAILINGS LEFT IN THEIR PRESENT CONFIGURATION WOULD REMAIN SUBJECT TO DISPERSAL BY WATER AND WIND. HUMAN EXPOSURE TO RADIOACTIVE CONSTITUENTS WOULD CONTINUE AT PRESENT LEVELS.

ALTERNATIVES 2 AND 3 ARE EQUALLY PROTECTIVE OF HUMAN HEALTH AND THE ENVIRONMENT. BOTH ALTERNATIVES WOULD ELIMINATE THE SOURCE OF GROUND WATER AND SURFACE-WATER CONTAMINATION BY REMOVING THE TAILINGS FROM THEIR PRESENT LOCATION. DURING TAILINGS REMOVAL ACTIVITIES, CONTROLS WOULD BE IN PLACE TO LIMIT DUST GENERATION AND TO PREVENT GROUND WATER CONTAMINATION. THE TAILINGS REPOSITORIES FOR BOTH ALTERNATIVES WOULD BE DESIGNED TO MEET THE REPOSITORY PERFORMANCE REQUIREMENTS OF 40 CFR 192, INCLUDING CAP DESIGN TO MINIMIZE RADON EMANATION. ALTERNATIVES 2 AND 3 BOTH REDUCE THE MOBILITY OF CONTAMINANTS BY PLACING THE TAILINGS AND ASSOCIATED MATERIALS IN REPOSITORIES CONFORMING TO THE REQUIREMENTS OF 40 CFR 192.

CURRENT ENVIRONMENTAL PROTECTION AGENCY GUIDANCE REQUIRES AN EVALUATION TO BE CONDUCTED EVERY FIVE YEARS FOR ALTERNATIVES IN WHICH CONTAMINANTS REMAIN ON SITE (AS WITH ALTERNATIVE 3). THESE FIVE YEAR EVALUATIONS WOULD ALLOW ASSESSMENT OF WHETHER FUTURE ACTION OR REMEDIATION WOULD BE REQUIRED. ANY PROBLEMS WITH PROTECTIVENESS IDENTIFIED IN THE FIVE-YEAR REVIEWS WILL BE ADDRESSED AT THAT TIME.

COMPLIANCE WITH APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

ALTERNATIVE 1, NO ACTION, WOULD VIOLATE THE URANIUM MILL TAILINGS RADIATION CONTROL ACT AND IMPLEMENTING REGULATIONS AT 40 CFR 192. THE

TAILINGS PILES WOULD NOT MEET DISPOSAL SITE DESIGN REQUIREMENTS NOR WOULD THEY MEET THE GROUND WATER STANDARDS PROPOSED TO BE ADDED TO 40 CFR 192. CONTINUED CONTAMINATION OF MONTEZUMA CREEK AND THE ALLUVIAL AQUIFER WOULD VIOLATE THE UTAH WATER POLLUTION CONTROL ACT AND UTAH'S GROUND WATER PROTECTION ACT.

ALTERNATIVE 2, REMOVAL OF TAILINGS AND TRANSPORT TO AN OFF-SITE LICENSED REPOSITORY, WOULD MEET THE APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS IDENTIFIED IN SECTION 10 AND DETAILED IN APPENDIX B. FOR EXAMPLE, MILL TAILINGS REMOVAL AND REPOSITORY OPERATIONS WILL COMPLY WITH THE APPLICABLE REQUIREMENTS UNDER THE CLEAN AIR ACT (40 CFR 61, SUBPART Q), AND STATE OF UTAH REQUIREMENTS FOR THE CONTROL OF FUGITIVE DUST EMISSIONS. ALL ACTIVITIES WILL COMPLY WITH THE OCCUPATIONAL SAFETY AND HEALTH ACT REQUIREMENTS. FLOOD-PLAIN/WETLANDS REQUIREMENTS WILL BE FOLLOWED DURING THE TEMPORARY DIVERSION OF MONTEZUMA CREEK AND ANY IMPACTS TO WETLANDS WILL BE MITIGATED. THE STATE OF UTAH'S WATER POLLUTION CONTROL ACT WILL BE ADHERED TO IF ANY DISCHARGES ARE MADE TO MONTEZUMA CREEK. THE EXISTING REPOSITORY WOULD POSSIBLY NEED A LICENSE AMENDMENT TO MEET THE REQUIREMENTS OF 40 CFR 192. ALSO, TO MEET THE PERTINENT REQUIREMENTS AT THE REPOSITORY, IT MAY BE NECESSARY TO OBTAIN

FEDERAL, STATE, OR LOCAL PERMITS.

ALTERNATIVE 3, TAILINGS REMOVAL AND DISPOSAL ON SITE, WOULD MEET ALL APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS IDENTIFIED IN SECTION 10 AND DETAILED IN APPENDIX B. MILL TAILINGS REMOVAL AND REPOSITORY OPERATIONS WILL COMPLY WITH APPLICABLE REQUIREMENTS UNDER THE CLEAN AIR ACT (40 CFR 61, SUBPART Q), AND STATE OF UTAH REQUIREMENTS FOR THE CONTROL OF FUGITIVE DUST EMISSIONS. ALL ACTIVITIES WILL COMPLY WITH OCCUPATIONAL SAFETY AND HEALTH ACT REQUIREMENTS. FLOODPLAIN/WETLANDS REQUIREMENTS OF EXECUTIVE ORDERS 11988 AND 11990 WILL BE FOLLOWED WHEN TEMPORARILY DIVERTING MONTEZUMA CREEK AND ANY IMPACTS TO WETLANDS WILL BE MITIGATED. THE STATE OF UTAH'S WATER POLLUTION CONTROL ACT WILL BE ADHERED TO IF ANY DISCHARGES ARE MADE TO MONTEZUMA CREEK. THE REPOSITORY WOULD BE DESIGNED TO MEET THE REQUIREMENTS OF 40 CFR 192. NO FEDERAL, STATE, OR LOCAL PERMITS WOULD BE REQUIRED SINCE THE REMEDIAL ACTION IS PERFORMED ON SITE; HOWEVER, SUBSTANTIVE PERMIT REQUIREMENTS WOULD BE MET.

REDUCTION OF TOXICITY, MOBILITY, OR VOLUME OF CONTAMINANTS BY TREATMENT

THE NO-ACTION ALTERNATIVE DOES NOT REDUCE TOXICITY, MOBILITY, OR VOLUME BECAUSE ALL CONTAMINATED MATERIALS WOULD BE LEFT IN PLACE. ALTERNATIVE 2 AND 3 DO NOT INCLUDE TREATMENT OF THE MILL TAILINGS AND THEREFORE DO NOT REDUCE TOXICITY, MOBILITY, OR VOLUME BY TREATMENT.

LONG-TERM EFFECTIVENESS AND PERMANENCE

THE NO-ACTION ALTERNATIVE WOULD RESULT IN THE CONTINUATION OF EXCESSIVE LONG-TERM RISK TO THE PUBLIC; THE TOTAL RADIOLOGIC RISK TO MONTICELLO RESIDENTS WOULD BE 2.38 X (10-2) EXCESS CANCER MORTALITIES (0.0238

ADDITIONAL CANCERS FOR THE ENTIRE POPULATION) PER YEAR. THIS ALTERNATIVE WOULD BE NEITHER EFFECTIVE NOR PERMANENT.

ALTERNATIVE 2 ACHIEVES THE GREATEST REDUCTION IN OVERALL RISK TO THE LOCAL POPULATION FROM RADIOLOGICAL CONTAMINATION, WITH A RISK REDUCTION OF 41 PERCENT FROM CURRENT CONDITIONS. THIS ALTERNATIVE ACHIEVES LONG-TERM EFFECTIVENESS BECAUSE THE CONTAMINANT SOURCE IS REMOVED. OPERATION OF THE LICENSED REPOSITORY IN CONFORMANCE WITH LICENSES AND PERMITS WILL HELP TO ASSURE THAT THE ALTERNATIVE IS ALSO A MORE PERMANENT SOLUTION THAN ALTERNATIVE 1, AND IS AS PERMANENT AS ALTERNATIVE 3.

ALTERNATIVE 3 ACHIEVES A 40 PERCENT REDUCTION IN RISK TO THE LOCAL POPULATION FROM RADIOLOGICAL CONTAMINATION WHEN COMPARED TO CURRENT CONDITIONS. THIS RISK REDUCTION IS SLIGHTLY LOWER THAN THE RISK REDUCTION ACHIEVED BY ALTERNATIVE 2 BECAUSE THE REPOSITORY IS LOCATED CLOSER TO THE LOCAL COMMUNITY. THE NONRADIOLOGIC RISK INDEX FOR MONTICELLO RESIDENTS AFTER REMEDIATION IS 0.09, WHICH MEANS THAT THE CUMULATIVE EXPOSURE TO NONRADIOLOGIC CONSTITUENTS IS LESS THAN THE CUMULATIVE ACCEPTABLE INTAKE, AND IS THEREFORE AN INDICATOR OF NO

ADVERSE HEALTH EFFECTS. A NONRADIOLOGIC RISK OF 1.0 OR GREATER INDICATES POTENTIAL ADVERSE HEALTH EFFECTS. THIS ALTERNATIVE ACHIEVES LONG-TERM EFFECTIVENESS BECAUSE THE CONTAMINATION SOURCE IS REMOVED. THE TAILINGS REPOSITORY WOULD BE DESIGNED AND MAINTAINED IN ACCORDANCE WITH THE REGULATIONS IDENTIFIED IN SECTION 10 OF THIS DOCUMENT; THE ALTERNATIVE IS MORE PERMANENT THAN ALTERNATIVE 1, AND IS AS PERMANENT AS ALTERNATIVE 2.

SHORT-TERM EFFECTIVENESS IN PROTECTING HUMAN HEALTH AND THE ENVIRONMENT

THE NO-ACTION ALTERNATIVE DOES NOT ENTAIL SHORT-TERM EFFECTIVENESS CONSIDERATIONS; THEREFORE, IT DOES NOT MEET THIS CRITERION, AS THE CRITERION IS NOT APPLICABLE.

ALTERNATIVES 2 AND 3 WOULD INVOLVE IDENTICAL SHORT-TERM IMPACTS DURING THE REMOVAL OF CONTAMINATED MATERIALS FROM THE MILLSITE. RADIOLOGICAL IMPACTS TO WORKERS AND THE PUBLIC WILL BE MINIMIZED BY ENGINEERING CONTROLS DURING REMEDIATION ACTIVITIES. A CONTROLLED WORK SITE WILL BE MAINTAINED TO LIMIT ACCESS TO THE MILLSITE AND AREAS OF CONSTRUCTION. DUST SUPPRESSANTS WILL BE UTILIZED AND AIR MONITORING WILL BE PERFORMED. THE STATE OF UTAH'S OCCUPATIONAL SAFETY AND HEALTH ACT WILL BE FOLLOWED.

ALTERNATIVE 2 INCLUDES ADDITIONAL IMPACTS DUE TO HAULAGE OF CONTAMINATED MATERIALS ON PUBLIC ROADS. THE NUMBER OF EXPECTED TRANSPORTATION INJURIES AND FATALITIES WILL INCREASE DUE TO THE NUMBER OF VEHICLES HAULING ON ROADWAYS, WITH 13.16 ADDITIONAL HIGHWAY INJURIES AND 0.12 FATALITIES OCCURRING. THE RATE OF HIGHWAY DETERIORATION WILL ALSO INCREASE. ALTERNATIVE 3 TRANSPORTATION IMPACTS ARE DUE ONLY TO WORKER TRANSPORTATION TO AND FROM THE WORK SITE ON PUBLIC ROADS. ALL HAULAGE OF CONTAMINATED MATERIAL WILL BE DONE ON SITE. AN ADDITIONAL 1.09

TRANSPORTATION INJURIES AND 0.010 FATALITIES CAN BE EXPECTED FOR ON-SITE DISPOSAL OF THE MILL TAILINGS.

IMPLEMENTABILITY

THE NO-ACTION ALTERNATIVE IS RELATIVELY EASY TO IMPLEMENT BECAUSE ENVIRONMENTAL MONITORING CURRENTLY EXISTS AND IS THE ONLY ACTIVITY INVOLVED.

ALTERNATIVES 2 AND 3 WOULD BE EQUALLY IMPLEMENTABLE DURING REMOVAL OF CONTAMINATED MATERIALS. CONVENTIONAL EXCAVATION TECHNOLOGY IS EFFECTIVE AND PROVEN IN REMOVING SOURCE MATERIAL SUCH AS TAILINGS. ALTERNATIVE 2 IS MORE DIFFICULT TO IMPLEMENT WITH REGARD TO THE REPOSITORY BECAUSE AN EXISTING LICENSED REPOSITORY WOULD HAVE TO AMEND ITS LICENSE PRIOR TO ACCEPTING MILLSITE MATERIALS. SINCE DISPOSAL ACTIVITIES ARE OFF SITE, FEDERAL, STATE, AND LOCAL PERMITS MAY BE REQUIRED. DISPOSAL IN AN ON-SITE REPOSITORY, ALTERNATIVE 3, HAS NEITHER OF THESE CONCERNS.

COST

THE NO-ACTION ALTERNATIVE IS THE LEAST EXPENSIVE TO IMPLEMENT. CAPITAL COSTS ARE ZERO. ANNUAL OPERATION AND MAINTENANCE COSTS FOR THE ENVIRONMENTAL MONITORING TO BE PERFORMED UNDER THIS ALTERNATIVE ARE $250,000. THE PRESENT WORTH OF ALTERNATIVE 1 USING A 5 PERCENT DISCOUNT RATE (I.E., AN INTEREST RATE OF 5 PERCENT AFTER INFLATION) IS $1,700,000.

REMOVAL OF TAILINGS AND TRANSPORT TO A LICENSED REPOSITORY (ALTERNATIVE 2) HAS CAPITAL COSTS OF $86,400,000 (IN 1989 CONSTANT DOLLARS) TO ACHIEVE A CELL THAT COMPLIES WITH 40 CFR 192 REQUIREMENTS, AND ANNUAL OPERATIONS AND MAINTENANCE COSTS OF $41,000. THE PRESENT WORTH OF THE ENTIRE REMEDIAL ACTION USING A 5 PERCENT DISCOUNT RATE (USING A REAL INTEREST RATE OF 5 PERCENT; OR, AN INTEREST RATE THAT IS 5 PERCENT HIGHER THAN THE INFLATION RATE) IS $69,874,000.

CAPITAL COSTS FOR TAILINGS REMOVAL AND DISPOSAL IN A REPOSITORY ON SITE (ALTERNATIVE 3) ARE $52,100,000, IN 1989 CONSTANT DOLLARS. ANNUAL OPERATIONS AND MAINTENANCE COSTS ARE $41,000. THE PRESENT WORTH USING A 5 PERCENT DISCOUNT RATE, AS DEFINED PREVIOUSLY, IS $42,346,000. THE REMEDIAL INVESTIGATION/FEASIBILITY STUDY REPORT PROVIDES DETAILS FOR ALL COSTS.

STATE ACCEPTANCE

THE NO-ACTION ALTERNATIVE DOES NOT HAVE STATE OF UTAH SUPPORT, AS EVIDENCED BY THE STATE'S SIGNING OF THE FEDERAL FACILITY AGREEMENT. THE STATE CURRENTLY HAS A POLICY EXCLUDING CERTAIN WASTES FROM DISPOSAL AT LICENSED REPOSITORIES AND HAS NOT ACCEPTED ALTERNATIVE 2. ALTERNATIVE 3 IS ACCEPTABLE TO THE STATE OF UTAH.

COMMUNITY ACCEPTANCE

ALTHOUGH SOME LOCAL RESIDENTS ARE NOT CONVINCED THAT THE MILL TAILINGS POSE A PROBLEM, COMMUNITY ACCEPTANCE OF THE NO-ACTION ALTERNATIVE IS LOW. LOCAL MINING INTERESTS ARE FAVORABLE TO ALTERNATIVE 2 AS IS THE LOCAL PUBLIC IN GENERAL. THE LOCAL PUBLIC IS ALSO SUPPORTIVE OF ALTERNATIVE 3.

OPERABLE UNIT II -- PERIPHERAL PROPERTIES

PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT

THE NO-ACTION ALTERNATIVE FAILS TO PROTECT HUMAN HEALTH AND THE ENVIRONMENT BECAUSE IT DOES NOT CONTROL THE MAJOR EXPOSURE PATHWAYS OF RADON EMISSIONS AND EXPOSURE TO GAMMA RADIATION. ALTERNATIVE 2, PERIPHERAL PROPERTY REMEDIATION, IS PROTECTIVE OF HUMAN HEALTH AND THE ENVIRONMENT BECAUSE THE CONTAMINATION SOURCE IS REMOVED AND WOULD ULTIMATELY BE DISPOSED OF IN A REPOSITORY MEETING THE REQUIREMENTS OF 40 CFR 192. CONTAMINANT MOBILITY IS ALSO REDUCED BY CONTAINMENT IN THE REPOSITORY. THE POTENTIAL OF USING ENVIRONMENTALLY SENSITIVE

CONSTRUCTION TECHNIQUES AND SUPPLEMENTAL STANDARDS APPLICATION ON PROPERTIES WHERE ENVIRONMENTAL HARM IS EXCESSIVE FURTHER ASSURES PROTECTION OF BOTH HUMAN HEALTH AND THE ENVIRONMENT. PRIOR TO USING SUPPLEMENTAL STANDARDS AT PERIPHERAL PROPERTIES WHERE ENVIRONMENTAL DAMAGE IS GROSSLY DISPROPORTIONATE TO HEALTH BENEFITS, THE SELECTED REMEDIAL ACTION MUST COME AS CLOSE TO MEETING THE OTHERWISE APPLICABLE STANDARDS AS IS REASONABLY POSSIBLE UNDER THE CIRCUMSTANCES AND MUST NOT POSE A CLEAR PRESENT OR FUTURE HAZARD.

COMPLIANCE WITH APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

THE NO-ACTION ALTERNATIVE FAILS TO MEET THE CLEAN-UP STANDARDS OF 40 CFR 192. REMEDIATION OF THE PERIPHERAL PROPERTIES TO 40 CFR 192.12 STANDARDS ASSURES COMPLIANCE WITH THIS REQUIREMENT. CLEAN UP WILL ALLOW THE STATE OF UTAH WATER POLLUTION REGULATIONS TO BE MET FOR DISCHARGES TO MONTEZUMA CREEK. ALL REMEDIATION ACTIVITIES WILL BE PERFORMED IN COMPLIANCE WITH THE OCCUPATIONAL SAFETY AND HEALTH ACT AND UTAH'S RULES FOR CONTROL OF FUGITIVE DUST EMISSIONS. THIS ALTERNATIVE WILL MEET ALL OTHER APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS DETAILED IN APPENDIX B.

USE OF TREATMENT TO ACHIEVE A REDUCTION IN TOXICITY, MOBILITY, OR VOLUME OF CONTAMINANTS

NO TREATMENT IS INVOLVED WITH THE NO-ACTION ALTERNATIVE, SO THIS CRITERION IS NOT MET. REMEDIATION OF THE PERIPHERAL PROPERTIES DOES NOT MEET THE CRITERION BECAUSE NO TREATMENT IS INVOLVED.

LONG-TERM EFFECTIVENESS AND PERMANENCE

THE NO-ACTION ALTERNATIVE DOES NOT MEET THIS CRITERION BECAUSE THE SOURCE OF CONTAMINATION IS LEFT IN PLACE. UNDER ALTERNATIVE 2, THE CONTAMINATED MATERIALS WILL ULTIMATELY BE PLACED IN A REPOSITORY MEETING THE PERFORMANCE REQUIREMENTS OF 40 CFR 192; THIS IS AN EFFECTIVE SOLUTION AND IS MORE PERMANENT THAN THE NO-ACTION ALTERNATIVE.

SHORT-TERM EFFECTIVENESS

THE NO-ACTION ALTERNATIVE DOES NOT INVOLVE SHORT-TERM EFFECTIVENESS CONSIDERATIONS; THEREFORE, THE CRITERION IS NOT APPLICABLE AND IS NOT MET. ALTERNATIVE 2, REMEDIATION OF THE PERIPHERAL PROPERTIES, MEETS THE CRITERION THROUGH ENGINEERING CONTROLS DURING REMEDIATION ACTIVITIES. FOR EXAMPLE, SUPPRESSANTS WOULD BE APPLIED TO CONTROL FUGITIVE DUST EMISSIONS, AIR-MONITORING WOULD BE PERFORMED TO DETERMINE WHEN RESPIRATORY PROTECTION IS NEEDED, AND THE RADIATION DOSE TO WORKERS WOULD BE MONITORED BY FILM BADGES.

IMPLEMENTABILITY

THE NO-ACTION ALTERNATIVE IS IMPLEMENTABLE BECAUSE NO ACTIVITY IS

REQUIRED. ALTERNATIVE 2 IS ALSO IMPLEMENTABLE BECAUSE THE TECHNOLOGY, SERVICES, AND MATERIALS TO PERFORM EITHER CONVENTIONAL OR ENVIRONMENTALLY SENSITIVE CONSTRUCTION ARE PROVEN AND READILY AVAILABLE.

COST

THE COST OF THE NO-ACTION ALTERNATIVE IS NEGLIGIBLE. THE ESTIMATED MINIMUM COST FOR REMEDIATION OF THE PROPERTIES, ALTERNATIVE 2, IS $12,648,000 USING CONVENTIONAL CONSTRUCTION ON ALL PROPERTIES EXCEPT THE CEMETERY AND DENSELY-VEGETATED HILLSIDES SOUTH OF MONTEZUMA CREEK (WHERE SUPPLEMENTAL STANDARDS COULD BE APPLIED). THE ESTIMATED MAXIMUM COST, ASSUMING ENVIRONMENTALLY SENSITIVE CONSTRUCTION IS USED ON ALL HEAVILY VEGETATED HILLSIDES AND CONVENTIONAL CONSTRUCTION IS USED ELSEWHERE, IS $18,460,000.

STATE ACCEPTANCE

THE STATE OF UTAH IS NOT SUPPORTIVE OF THE NO-ACTION ALTERNATIVE, AS EVIDENCED BY ITS SIGNING OF THE FEDERAL FACILITY AGREEMENT. THE STATE SUPPORTS REMEDIATION OF THE PERIPHERAL PROPERTIES TO THE STANDARDS OF 40 CFR 192. THE STATE OF UTAH ALSO CONCURS WITH THE POSSIBLE USE OF SUPPLEMENTAL STANDARDS ON HILLSIDE DENSE VEGETATION SOUTH OF THE MILLSITE.

COMMUNITY ACCEPTANCE

COMMUNITY SUPPORT FOR THE NO-ACTION ALTERNATIVE IS LOW, ALTHOUGH SOME RESIDENTS DOUBT THAT A REAL RISK IS POSED BY THE MILL TAILINGS-RELATED CONTAMINATION. OVERALL, THE COMMUNITY IS SUPPORTIVE OF THE REMEDIATION ALTERNATIVE (SEE APPENDIX A FOR DETAILS).

#SR
SELECTED REMEDY

THE SELECTED REMEDY FOR THE MONTICELLO MILL TAILINGS SITE INVOLVES REMOVAL OF TAILINGS, BY-PRODUCT MATERIAL (AS DEFINED IN SECTION 11(E)(2) OF THE ATOMIC ENERGY ACT OF 1954 AS AMENDED, AND IN 40 CFR PART 192 TO MEAN "TAILINGS OR WASTE PRODUCED BY THE EXTRACTION OR CONCENTRATION OF URANIUM FROM ANY ORE PROCESSED PRIMARILY FOR ITS SOURCE MATERIAL CONTENT"), AND CONTAMINATED BUILDINGS AND EQUIPMENT MATERIAL, WITH DISPOSAL OF THESE MATERIALS ON SITE FOR OPERABLE UNIT I; AND REMEDIATION TO 40 CFR 192 STANDARDS FOR OPERABLE UNIT II, PERIPHERAL PROPERTIES, BY EITHER CONVENTIONAL OR ENVIRONMENTALLY SENSITIVE CONSTRUCTION, OR IN LIMITED CASES, THE USE OF SUPPLEMENTAL STANDARDS. GROUND WATER AND SURFACE-WATER RESTORATION WILL BE ADDRESSED IN A SEPARATE RECORD OF DECISION FOLLOWING INITIATION OF REMEDIATION FOR OPERABLE UNITS I AND II.

DETAILED DESCRIPTIONS OF THE SELECTED ALTERNATIVES FOLLOW. THE

REMEDIATION GOALS, CORRESPONDING RISK LEVELS TO BE ATTAINED, AND POINTS OF COMPLIANCE FOR EACH MEDIUM ADDRESSED BY THE REMEDY, ARE DISCUSSED. FINALLY, A DETAILED DISCUSSION OF THE COSTS OF EACH COMPONENT OF THE REMEDY IS PRESENTED.

SELECTED ALTERNATIVES

OPERABLE UNIT I -- REMOVAL OF TAILINGS AND DISPOSAL IN A REPOSITORY ON SITE, SOUTH OF THE PRESENT LOCATION

THE SELECTED ALTERNATIVE FOR OPERABLE UNIT I WOULD RELOCATE THE MILL TAILINGS, BY-PRODUCT MATERIAL, AND CONTAMINATED BUILDING AND EQUIPMENT MATERIALS, TO PROPERTY SOUTH OF AND ADJACENT TO THE PRESENT MILLSITE (SEE FIGURE 9-1). THE CONTAMINATED MATERIALS WILL BE MOVED OUT OF THE MONTEZUMA CREEK FLOODPLAIN AND THE TAILINGS PILES WILL BE REMOVED FROM THEIR CURRENT CONTACT WITH THE ALLUVIAL AQUIFER. THIS ACTION HAS BEEN DETERMINED TO BE AN ON-SITE RESPONSE ACTION BY THE ENVIRONMENTAL PROTECTION AGENCY. ON THE BASIS OF CURRENT INFORMATION, THIS ALTERNATIVE PROVIDES THE BEST BALANCE OF TRADE-OFFS AMONG THE ALTERNATIVES WITH RESPECT TO THE FIVE BALANCING CRITERIA USED TO EVALUATE ALTERNATIVES (SEE TABLE 8-1).

THIS REMEDY WILL REQUIRE REMOVAL TO A PROPERTY CONTIGUOUS TO AND ADJACENT WITH A CONTAMINATED PERIPHERAL PROPERTY SOUTH OF THE MILLSITE. THE PROPOSED REPOSITORY SITE IS NOT OWNED BY THE DEPARTMENT OF ENERGY AND WOULD NEED TO BE PURCHASED. REMEDIAL ACTIVITIES WOULD BE CONDUCTED ON SITE AND WOULD BE EXEMPT FROM THE NECESSITY OF OBTAINING ALL FEDERAL, STATE, AND LOCAL PERMITS; HOWEVER, THE SUBSTANTIVE REQUIREMENTS OF THESE PERMITS WOULD BE MET.

THE PRIMARY GOAL OF THE REMEDIAL ACTION FOR OPERABLE UNIT I IS TO ELIMINATE THE POTENTIAL FOR EXPOSURE OF THE POPULATION OF MONTICELLO TO ENHANCED LEVELS (ABOVE BACKGROUND) OF RADON GAS AND GAMMA RADIATION THAT POSE EXCESS CANCER RISKS. FOLLOWING REMEDIATION, THE RADIOLOGIC RISK TO THE POPULATION WILL BE REDUCED BY 40 PERCENT FROM THE CURRENT CONDITIONS.

THE OCCURRENCE OF CHEMICALLY HAZARDOUS SUBSTANCES NOT ASSOCIATED WITH TAILINGS OR PROCESS-WASTE EXPOSURE HAS BEEN PURSUED, BUT HAS YIELDED NO SUBSTANTIVE EVIDENCE OF CONTAMINATION BY THESE SUBSTANCES. THEREFORE, NO PUBLIC HEALTH EVALUATION WAS PERFORMED FOR THESE SUBSTANCES. IF DURING REMEDIAL ACTION, HAZARDOUS WASTES ARE ENCOUNTERED ON SITE, THEY SHALL BE REMEDIATED AND DISPOSED OF IN ACCORDANCE WITH THE RESOURCE CONSERVATION AND RECOVER ACT AND ANY OTHER APPLICABLE REGULATIONS. BY-PRODUCT MATERIAL ASSOCIATED WITH MILL PROCESSING WILL BE DISPOSED OF IN THE REPOSITORY.

RADIOLOGICALLY CONTAMINATED BUILDING MATERIALS AND MILL EQUIPMENT WILL BE, TO THE EXTENT PRACTICAL AND IN ACCORDANCE WITH PREVAILING STANDARDS, DECONTAMINATED AND EITHER RELEASED FOR UNRESTRICTED USE AS DEFINED BY

DEPARTMENT OF ENERGY ORDERS, RELEASED FOR RESTRICTED USE AS DEFINED BY DEPARTMENT OF ENERGY ORDERS, OR DISPOSED OF IN A SANITARY LANDFILL. THE REPOSITORY WILL BE USED FOR DISPOSAL OF SOME OF THIS RADIOLOGICALLY CONTAMINATED MATERIAL, BUT THE QUANTITY WILL BE KEPT TO A MINIMUM AND MATERIALS WILL BE DISPOSED OF IN STRICT ACCORDANCE WITH THE REPOSITORY DESIGN SPECIFICATIONS.

AN ADDITIONAL REMEDIATION GOAL IS TO ELIMINATE THE POTENTIAL FOR LEACHING OF CONTAMINANTS IN THE MILL TAILINGS TO GROUND WATER AND SURFACE WATER. THESE GOALS WILL BE ACHIEVED BY DIVERTING MONTEZUMA CREEK AWAY FROM ITS CURRENT CHANNEL WHERE IT IS IN CONTACT WITH MILL TAILINGS PILES, REMOVING THE TAILINGS AND RELOCATING THEM TO THE SECURE REPOSITORY, REPLACING THE TAILINGS PILES WITH CLEAN FILL, GRADING AND REVEGETATING THE SITE TO PROVIDE PROPER SURFACE DRAINAGE, AND RECONSTRUCTING THE CHANNEL OF MONTEZUMA CREEK TO ITS PRE-MILLSITE HISTORIC LOCATION. IN ADDITION, ANY DEWATERING OF TAILINGS OR WATER REMOVED FROM CONTAMINATED SOILS WILL BE TREATED AND RELEASED TO THE ENVIRONMENT. IF DISCHARGED TO MONTEZUMA CREEK, THE WASTE WATER WOULD BE TREATED TO MEET UTAH'S REQUIREMENTS FOR DISCHARGE TO SURFACE WATERS (UCA TITLE 26, CHAPTER 11; R-448-8 UAC).

THE REMEDIATION OF THE MILL TAILINGS AND ASSOCIATED MATERIALS WILL COMPLY WITH THE PRINCIPAL RELEVANT AND APPROPRIATE REQUIREMENT, 40 CFR PART 192.12, WHICH SPECIFIES THE MAXIMUM PERMISSIBLE CONCENTRATION OF RADIUM-226 ABOVE BACKGROUND LEVELS. SOILS WITH RADIUM-226 CONCENTRATION ABOVE 6 PCI/G IN THE 0-TO 6-INCH (15 CM) LAYER, AND 16 PCI/G IN ANY SUBSEQUENT 6-INCH (15 CM) LAYER BELOW 6 INCHES (15 CM) ARE CONSIDERED TO BE CONTAMINATED AND WILL BE REMOVED (USING AN AVERAGE BACKGROUND LEVEL OF 1.0 PLUS AND MINUS 0.4 PCI/G).

THE TAILINGS REPOSITORY WOULD BE DESIGNED TO CONTAIN APPROXIMATELY 2.5 MILLION CUBIC YARDS OF TAILINGS AND CONTAMINATED MATERIALS AND WOULD COVER APPROXIMATELY 40 ACRES OF DISPOSAL AREA. IT IS ESTIMATED THAT ABOUT 1.9 MILLION CUBIC YARDS OF CONTAMINATED MATERIAL WILL BE REMOVED AND TRANSPORTED TO THE REPOSITORY. MATERIALS REMOVED FROM PERIPHERAL PROPERTIES WILL BE TEMPORARILY STORED AT THE MILL TAILINGS SITE, AND THEN TRANSPORTED TO THE REPOSITORY. INCLUDED IN THE CONTAMINATED MATERIAL TO BE RECEIVED AT THE REPOSITORY IS APPROXIMATELY 100,000 CUBIC YARDS OF CONTAMINATED SOIL AND BUILDING MATERIALS FROM THE MONTICELLO VICINITY PROPERTIES NATIONAL PRIORITIES LIST SITE (THIS MATERIAL WAS THE SUBJECT OF THE MONTICELLO VICINITY PROPERTIES RECORD OF DECISION).

DESIGN COMPONENTS OF THE TAILINGS REPOSITORY WILL BE BASED ON THE DEPARTMENT OF ENERGY'S URANIUM MILL TAILINGS REMEDIAL ACTION PROGRAM RESEARCH AND PRACTICE STANDARDS (INCLUDING THE LATEST REVISION OF THE TECHNICAL APPROACH DOCUMENT, REVISION 2, DECEMBER 1989, DOE/AL-050425.0002). DURING DESIGN, ENGINEERING CONSIDERATIONS WILL TAKE INTO ACCOUNT SUCH FACTORS AS RADON GAS MINIMIZATION, EROSION CONTROL, DUST CONTROL, WATER INFILTRATION CONTROL, AND SITE SECURITY. THE STATE OF UTAH AND THE ENVIRONMENTAL PROTECTION AGENCY WILL HAVE

REVIEW AUTHORITY ON REMEDIAL DESIGN ACTIVITIES TO ENSURE THAT THE MOST APPROPRIATE TECHNOLOGY IS USED IN THE FINAL DESIGN. THE REPOSITORY WILL BE DESIGNED TO COMPLY WITH THE REQUIREMENTS OF 40 CFR PART 192, WHICH REQUIRES THAT THE REPOSITORY BE DESIGNED TO:

* BE EFFECTIVE FOR AT LEAST 200 YEARS AND TO THE EXTENT REASONABLY ACHIEVABLE, TO BE EFFECTIVE FOR UP TO 1,000 YEARS;

* PROVIDE REASONABLE ASSURANCE THAT RELEASES OF RADON-222 FROM RESIDUAL RADIOACTIVE MATERIAL WILL NOT EXCEED AN AVERAGE RELEASE RATE OF 20 PICOCURIES PER SQUARE METER PER SECOND (PCI/M2/S); AND

* PROVIDE REASONABLE ASSURANCE THAT RELEASES OF RADON-222 FROM RESIDUAL RADIOACTIVE MATERIAL WILL NOT INCREASE THE AVERAGE CONCENTRATION OF RADON-222 IN AIR AT OR ABOVE ANY LOCATION OUTSIDE THE DISPOSAL SITE BY MORE THAN 0.5 PCI/L.

THE COMPLIANCE POINT FOR THE STANDARDS APPLYING TO RADON-222 EMISSIONS IS THE ENTIRE SURFACE OF THE REPOSITORY. IN ADDITION, PROPOSED ADDITIONAL STANDARDS TO 40 CFR PART 192.32 (SUBPART D), REQUIRE THAT URANIUM MILL TAILINGS BE MANAGED TO CONFORM TO THE GROUND WATER PROTECTION STANDARDS AND WITH MONITORING REQUIREMENTS OF 40 CFR PART 264.92 (SUBPART F). THE POINT OF COMPLIANCE FOR MONITORING IS DEFINED IN 40 CFR PART 264.95 AS BEING THE VERTICAL SURFACE LOCATED AT THE HYDRAULICALLY DOWNGRADIENT LIMIT OF THE WASTE MANAGEMENT AREA THAT EXTENDS DOWN INTO THE UPPERMOST AQUIFER UNDERLYING THE REGULATED UNITS.

THE COSTS OF REMEDIATION OF OPERABLE UNIT I ARE PRESENTED IN TABLE 9-1.

THE TOTAL CAPITAL COST OF THE PROJECT, IN 1989 DOLLARS, IS ESTIMATED TO BE $52.1 MILLION, INCLUDING CONTINGENCY COSTS OF $8.69 MILLION. ANNUAL OPERATION AND MAINTENANCE COSTS IN 1989 DOLLARS ARE ESTIMATED TO BE $40,800 PER YEAR FOR THE PERIOD 1996 TO 2020, INCLUDING CONTINGENCY COSTS OF $6,800 PER YEAR. THE TOTAL PROJECT COST IN 1989 DOLLARS CALCULATED USING A DISCOUNT RATE OF 5 PERCENT IS ESTIMATED TO BE $42.346 MILLION.

SOME CHANGES MAY BE MADE TO THE SELECTED REMEDY AS A RESULT OF THE REMEDIAL DESIGN AND CONSTRUCTION PROCESS. IN GENERAL, SUCH CHANGES WILL REFLECT RELATIVELY MINOR MODIFICATIONS RESULTING FROM THE ENGINEERING DESIGN PROCESS.

OPERABLE UNIT II -- PERIPHERAL PROPERTIES CLEAN UP TO 40 CFR 192.12 STANDARDS

THE PROPOSED ACTION CONSISTS OF REMOVAL OF CONTAMINATED MATERIALS AND RELOCATION TO THE MILLSITE TAILINGS PILE, WITH ULTIMATE DISPOSAL IN THE REPOSITORY DESCRIBED FOR OPERABLE UNIT I. REMOVAL WILL BE ACHIEVED BY ENVIRONMENTALLY SENSITIVE CONSTRUCTION PRACTICES, AND/OR CONVENTIONAL

CONSTRUCTION TECHNIQUES TO MEET THE STANDARDS OF 40 CFR 192.12. TECHNIQUES WILL VARY DEPENDING ON THE DEGREE OF CONTAMINATION AND THE ENVIRONMENTAL CONSEQUENCES OF REMEDIATING SPECIFIC LAND TYPES.

THE OCCURRENCE OF CHEMICALLY HAZARDOUS SUBSTANCES NOT ASSOCIATED WITH TAILINGS OR PROCESS-WASTE EXPOSURE HAS BEEN PURSUED, BUT HAS YIELDED NO SUBSTANTIVE EVIDENCE OF CONTAMINATION BY THESE SUBSTANCES. THEREFORE, NO PUBLIC HEALTH EVALUATION WAS PERFORMED FOR THESE SUBSTANCES. IF DURING REMEDIAL ACTION, HAZARDOUS SUBSTANCES OR MATERIALS NOT EXCLUDED FROM THE RESOURCES CONSERVATION AND RECOVERY ACT (E.G., 40 CFR 261.4(A)(II)(4) SOURCE, SPENT NUCLEAR, OR BY-PRODUCT MATERIAL AS DEFINED BY THE ATOMIC ENERGY ACT OF 1954, AS AMENDED, USC 2011, ET SEQ.) ARE FOUND ON SITE, THEY SHALL BE REMEDIATED AND/OR DISPOSED OF IN ACCORDANCE WITH APPLICABLE REGULATIONS, INCLUDING RESOURCE CONSERVATION AND RECOVERY ACT REQUIREMENTS, IF DETERMINED TO BE APPLICABLE OR RELEVANT AND APPROPRIATE. ANY BY-PRODUCT MATERIAL ASSOCIATED WITH MILL PROCESSING AND FOUND ON PERIPHERAL PROPERTIES, WILL BE DISPOSED OF IN THE REPOSITORY.

TABLE 9-1. ESTIMATED COSTS OF THE SELECTED REMEDY FOR OPERABLE UNIT I (REMOVAL OF TAILINGS AND DISPOSAL ON SITE, SOUTH OF PRESENT LOCATION)

CAPITAL COSTS	TOTAL
MILLSITE SITE PREPARATION	$ 740,000
REPOSITORY SITE PREPARATION	7,160,000
MILLSITE REMEDIATION (REMOVAL)	7,350,000
CONSTRUCTION OF REPOSITORY	7,480,000
MILLSITE RESTORATION	2,125,000

REPOSITORY RESTORATION	2,360,000
MOBILIZATION/DEMOBILIZATION	815,000
INDIRECT COSTS	15,420,000
SUBTOTAL	$ 43,450,000
CONTINGENCY (AT 20 PERCENT)	8,690,000
TOTAL PROJECT COSTS (1989 DOLLARS)	$ 52,140,000

OPERATION AND MAINTENANCE ANNUAL COSTS	ANNUAL COST
GROUND WATER MONITORING AND SURVEILLANCE (1996-2020)	$ 34,038
CONTINGENCY (AT 20 PERCENT)	6,808
TOTAL ANNUAL O&M COSTS (1989 DOLLARS)	$ 40,846

1989 TOTAL PRESENT WORTH (PRESENT WORTH CALCULATED 5 PERCENT DISCOUNT RATE)	$ 42,346,400

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SOILS WITH RADIUM CONCENTRATIONS ABOVE 6 PCI/G IN THE 0 TO 6 INCH LAYER OF SOIL AND CONCENTRATIONS ABOVE 16 PCI/G IN EACH SUBSEQUENT 6 INCH INCREMENT BELOW THE TOP LAYER ARE CONSIDERED TO BE CONTAMINATED (USING A BACKGROUND CONCENTRATION OF 1.0 PLUS AND MINUS 0.4 PCI/G) AND WILL BE REMOVED. THE PERIPHERAL PROPERTIES INCLUDE IRRIGATED MESA PASTURE LANDS, AREAS OF DENSE HILLSIDE VEGETATION, LOW HILLSIDE VEGETATION, HILLTOP DRYLAND PASTURE, CREEK-BOTTOM PASTURE, THE US BUREAU OF LAND MANAGEMENT COMPOUND, CREEK BANKS ALONG UPPER MONTEZUMA CREEK AND THE MONTICELLO CEMETERY. THE PROPERTIES CONSTITUTING UPPER AND LOWER MONTEZUMA CREEK WILL BE REMEDIATED WITH OPERABLE UNIT III, FOLLOWING INITIATION OF REMEDIATION FOR OPERABLE UNITS I AND II.

IN AREAS WITH MATURE DENSE VEGETATION, HAND EXCAVATION COULD BE USED SUCCESSFULLY TO REMOVE THE CONTAMINATED SOILS AND TO MINIMIZE ENVIRONMENTAL DAMAGE TO THOSE AREAS THAT HAVE IMPORTANT WILDLIFE HABITAT. AN OPTION TO HAND EXCAVATION WOULD BE THE USE OF HIGH-SUCTION VACUUM EQUIPMENT SPECIFICALLY DESIGNED FOR CLEANING UP HAZARDOUS WASTE SPILLS. THIS EQUIPMENT HAS COSTS SIMILAR TO HAND EXCAVATION YET WOULD TEND TO CLEAN UP MORE PRECISELY THE ACTUAL AREAS OF CONTAMINATION.

WHERE ACCEPTABLE, CONVENTIONAL CONSTRUCTION TECHNIQUES WILL BE USED TO REMOVE CONTAMINATED SOILS FROM SPECIFIC AREAS, INCLUDING THOSE PREVIOUSLY DISTURBED, SUCH AS FARM LAND. THIS INVOLVES THE USE OF LARGE EARTHMOVING EQUIPMENT TO REMOVE THE CONTAMINATED SOIL. THE REMOVED SOIL WOULD BE REPLACED WITH CLEAN MATERIAL AND THE SITE WOULD BE REVEGETATED. ON SEVERAL PROPERTIES, A COMBINATION OF CONVENTIONAL AND ENVIRONMENTALLY SENSITIVE CONSTRUCTION TECHNIQUES WILL BE USED. AS A RESULT OF MEETING THE CONTAMINANT-SPECIFIC APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS, IT IS EXPECTED THAT EXPOSURE OF INHABITANTS IN THE MONTICELLO AREA TO HEALTH RISKS FROM RADIATION IN EXCESS OF BACKGROUND

LEVELS WILL BE REDUCED TO ACCEPTABLE LEVELS. RADIATION RISKS ARE PRIMARILY ASSOCIATED WITH INHALATION OF RADON-222 AND EXPOSURE TO GAMMA RADIATION. WHERE CONVENTIONAL OR ENVIRONMENTALLY SENSITIVE CONSTRUCTION TECHNIQUES ARE USED TO REMOVE CONTAMINATED MATERIALS, RADIOLOGIC RISKS WILL BE REDUCED TO BACKGROUND LEVELS. NONRADIOLOGIC LONG-TERM RISK TO INDIVIDUALS AFTER PERIPHERAL PROPERTY REMEDIATION WAS INCLUDED IN THE COMPARATIVE ANALYSIS OF OPERABLE UNIT I, AND IS CONSIDERED INSIGNIFICANT.

THE ENVIRONMENTAL PROTECTION AGENCY AND THE STATE OF UTAH WILL EVALUATE PROPOSALS FOR THE USE OF SUPPLEMENTAL STANDARDS ON DENSELY VEGETATED HILLSIDES SOUTH OF MONTEZUMA CREEK AND AT THE MONTICELLO CEMETERY DURING REMEDIAL DESIGN. SUPPLEMENTAL STANDARDS, WHICH ALLOW LEAVING CONTAMINATION IN PLACE, ARE STANDARDS INCLUDED WITHIN THE PRINCIPAL RELEVANT AND APPROPRIATE REQUIREMENT, 40 CFR 192. THESE STANDARDS ARE TYPICALLY APPLIED TO AREAS WHERE PHYSICAL REMOVAL OF MATERIALS WOULD CAUSE UNDUE ENVIRONMENTAL DAMAGE IN COMPARISON WITH THE DERIVED ENVIRONMENTAL AND HEALTH BENEFITS. IN AREAS WHERE SUPPLEMENTAL STANDARDS MAY BE APPLIED, RADIATION DOSE IS CURRENTLY ESTIMATED TO BE WITHIN 1 PERCENT OF HEALTH-BASED STANDARDS.

OPERABLE UNIT II CONSISTS OF AN ESTIMATED 311,600 CUBIC YARDS OF CONTAMINATED MATERIAL (INCLUDING 8,000 CUBIC YARDS OF MATERIAL TO WHICH SUPPLEMENTAL STANDARDS MAY APPLY). THE CAPITAL COSTS OF REMEDIATION OF THIS OPERABLE UNIT ARE PRESENTED IN TABLE 9-2. UNIT COSTS HAVE BEEN PRESENTED FOR EACH LAND TYPE AND EACH CONSTRUCTION ALTERNATIVE WHERE MORE THAN ONE CONSTRUCTION ALTERNATIVE IS AVAILABLE. THEREFORE, A RANGE OF TOTAL COSTS IS PRESENTED. THE COSTS RANGE FROM $12.648 MILLION (ASSUMING CONVENTIONAL CONSTRUCTION TECHNIQUES ARE USED ON ALL PROPERTIES EXCEPT THAT SUPPLEMENTAL STANDARDS ARE APPLIED TO THE CEMETERY AND SOUTH HILLSIDE) TO $18.460 MILLION (ASSUMING THAT SUPPLEMENTAL STANDARDS ARE NOT USED, ENVIRONMENTALLY SENSITIVE CONSTRUCTION TECHNIQUES ARE USED TO THE MAXIMUM EXTENT POSSIBLE, AND CONVENTIONAL TECHNIQUES ARE USED ELSEWHERE). THE TOTAL COSTS ARE PROVIDED IN 1989 DOLLARS, AND CALCULATED USING A DISCOUNT RATE OF 5 PERCENT. THE COSTS INCLUDE TRANSPORTING THE CONTAMINATED MATERIAL TO THE MILLSITE. COSTS OF SUBSEQUENT TRANSPORT AND DISPOSAL OF THE MATERIAL AT THE REPOSITORY SOUTH OF THE MILLSITE ARE INCLUDED IN THE COST OF REMEDIATION OF OPERABLE UNIT I.

SIGNIFICANT DIFFERENCES FROM THE PROPOSED PLAN

THE PROPOSED PLAN WAS RELEASED FOR PUBLIC COMMENT IN OCTOBER 1989. THE PLAN IDENTIFIED THREE OPERABLE UNITS TO BE REMEDIATED AT THE MONTICELLO MILL TAILINGS SITE. THE DECISION MADE FOR REMEDIATION OF OPERABLE UNIT I REMAINS AS IDENTIFIED IN THE PROPOSED PLAN. OPERABLE UNIT II WILL BE REMEDIATED WITH OPERABLE UNIT I EXCEPT THAT THE UPPER AND LOWER MONTEZUMA CREEK PROPERTIES WILL BE REMEDIATED WITH OPERABLE UNIT III. SELECTION OF A PREFERRED ALTERNATIVE FOR OPERABLE UNIT III, GROUND WATER AND SURFACE WATER, HAS BEEN DELAYED UNTIL REMEDIATION OF THE OTHER TWO

OPERABLE UNITS IS UNDERWAY. A DECISION FOR RESTORATION OF THIS OPERABLE UNIT IS POSTPONED BECAUSE SURFACE WATER AND AQUIFER CHARACTERISTICS WILL NECESSARILY CHANGE DURING REMEDIATION ACTIVITIES FOR OPERABLE UNITS I AND II. FOLLOWING DATA COLLECTION AND ANALYSIS DURING AND FOLLOWING OPERABLE UNITS I AND II REMEDIATION, THE DEPARTMENT OF ENERGY, THE ENVIRONMENTAL PROTECTION AGENCY, AND STATE OF UTAH WILL DETERMINE THE ADDITIONAL STEPS NEEDED TO RESTORE THE ALLUVIAL AQUIFER. THE AFOREMENTIONED PARTIES WILL WORK TOGETHER UNDER THE EXISTING FEDERAL FACILITIES AGREEMENT TO DEVELOP A RECORD OF DECISION PURSUANT TO THE COMPREHENSIVE ENVIRONMENTAL RESPONSE, COMPENSATION, AND LIABILITY ACT, AS AMENDED, AND IN ACCORDANCE WITH THE REQUIREMENTS OF THE NATIONAL CONTINGENCY PLAN.

THIS APPROACH DIFFERS FROM THAT IN THE PROPOSED PLAN FOR OPERABLE UNITS II AND III. WHILE IT IS CONSIDERED A SIGNIFICANT CHANGE, A NEW PUBLIC COMMENT PERIOD IS NOT REQUIRED AT THIS TIME, BUT WILL BE INCLUDED IN THE DEVELOPMENT OF A SURFACE- AND GROUND WATER RECORD OF DECISION AT A LATER DATE.

#SD
STATUTORY DETERMINATIONS

THE SELECTED REMEDY MEETS THE STATUTORY REQUIREMENTS OF SECTION 121 OF THE COMPREHENSIVE ENVIRONMENTAL RESPONSE, COMPENSATION, AND LIABILITY ACT. THE STATUTORY DETERMINATIONS FOR THE PREFERRED SURFACE- AND GROUND WATER REMEDY (OPERABLE UNIT III) WILL BE DISCUSSED IN A SEPARATE RECORD OF DECISION THAT WILL BE PREPARED FOLLOWING THE INITIATION OF REMEDIATION OF OPERABLE UNITS I AND II AND THE COLLECTION AND ANALYSIS OF ADDITIONAL MONITORING DATA.

PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT

THE SELECTED REMEDY FOR OPERABLE UNIT I (MILL TAILINGS AND MILLSITE PROPERTY) AND OPERABLE UNIT II (PERIPHERAL PROPERTIES) PROTECTS HUMAN HEALTH AND THE ENVIRONMENT THROUGH THE FOLLOWING ENGINEERING CONTROLS:

* EXCAVATION OF ALL MATERIALS AT THE MILLSITE CONTAMINATED AT LEVELS ABOVE HEALTH-BASED STANDARDS SPECIFIED UNDER THE URANIUM MILL TAILINGS RADIATION CONTROL ACT IN 40 CFR 192.12;

* RELOCATION OF THE CONTAMINATED MATERIALS TO A REPOSITORY CONSTRUCTED TO MEET DESIGN STANDARDS AND MONITORING STANDARDS OF THE URANIUM MILL TAILINGS RADIATION CONTROL ACT.

THE SELECTED REMEDY FOR OPERABLE UNIT I WILL ELIMINATE THE SOURCE OF GROUND WATER AND SURFACE-WATER CONTAMINATION. THE SELECTED REMEDY WILL RESULT IN A 40 PERCENT REDUCTION IN RADIOLOGIC RISK TO THE MONTICELLO

POPULATION. AFTER TAILINGS REMOVAL, THE ANNUAL CANCER RISK TO THE MONTICELLO POPULATION FROM RADIOACTIVE CONSTITUENTS WOULD BE 1.43 X (10-2) AS COMPARED TO THE EXISTING LEVEL OF 2.38 X (10-2) (OR, 0.0143 ADDITIONAL CANCERS PER YEAR FOR THE ENTIRE POPULATION COMPARED TO THE EXISTING ESTIMATE OF 0.0238 CANCERS). ALTHOUGH THE MILLSITE REMEDIATION WILL FOLLOW HEALTH-BASED REMEDIATION STANDARDS FOR THE RADIOACTIVELY CONTAMINATED MATERIALS (40 CFR 192.12) TO ACHIEVE ACCEPTABLE RISK, A GROSS ESTIMATE WAS MADE FOR THE EXCESS LIFETIME CANCER INCIDENCE TO AN INDIVIDUAL FOLLOWING REMEDIATION. THE ESTIMATE IS 6 X (10-6) EXCESS CANCER INCIDENCES DUE TO RADIOLOGIC CONSTITUENTS FOR AN INDIVIDUAL, FOLLOWING REMEDIATION. BECAUSE THE ENVIRONMENTAL PROTECTION AGENCY'S ACCEPTABLE RISK RANGE IS FROM 1 X (10-4) TO 1 X (10-6) EXCESS LIFETIME CANCERS, THIS ROUGH ESTIMATE COULD BE LOW BY NEARLY TWO ORDERS OF MAGNITUDE AND STILL BE BELOW THE UPPER BOUND OF THE ACCEPTABLE RISK RANGE. THE SELECTED REMEDY WILL NOT POSE UNACCEPTABLE SHORT-TERM RISKS AND WILL DECREASE CROSS-MEDIA IMPACTS. THE NONRADIOLOGICAL RISK INDEX FOR MONTICELLO RESIDENTS AFTER COMPLETION OF THE SELECTED REMEDY FOR OPERABLE UNIT I IS "0.09", WHICH IS AN INDICATION OF NO ADVERSE HEALTH EFFECTS. (THE ENVIRONMENTAL PROTECTION AGENCY CONSIDERS A RISK INDEX GREATER THAN 1.0 TO BE INDICATIVE OF

ADVERSE HEALTH EFFECTS.)

THE REMEDY SELECTED FOR OPERABLE UNIT I MINIMIZES ADVERSE IMPACTS TO FLOODPLAIN/WETLANDS AND WATERS OF THE US THROUGH THE AVOIDANCE OF UNNECESSARY IMPACTS TO THESE AREAS. WHERE ADVERSE IMPACTS ARE UNAVOIDABLE, THERE IS A DETERMINATION OF MEETING THE SUBSTANTIVE REQUIREMENTS OF THE CLEAN WATER ACT, EXECUTIVE ORDER 11988 AND 11990. MITIGATION OF UNAVOIDABLE IMPACTS TO THESE AREAS WILL BE ACCOMPLISHED THROUGH FLOODPLAIN/WETLAND RESTORATION AND CREATION PROJECTS, AND CHANNEL RECONSTRUCTION.

THE SELECTED REMEDY FOR OPERABLE UNIT II (PERIPHERAL PROPERTIES) WILL PROTECT HUMAN HEALTH AND THE ENVIRONMENT THROUGH THE FOLLOWING ENGINEERING CONTROLS:

* EXCAVATION OF CONTAMINATED MATERIALS USING EITHER CONVENTIONAL OR ENVIRONMENTALLY SENSITIVE CONSTRUCTION TECHNIQUES IN AREAS WHERE REMOVAL IS REQUIRED TO MEET HEALTH-BASED STANDARDS OF 40 CFR 192.12;

* RELOCATION OF THE EXCAVATED MATERIAL TO A REPOSITORY AS DESCRIBED FOR OPERABLE UNIT I.

THE SELECTED REMEDY FOR OPERABLE UNIT II WILL REDUCE RADIOLOGIC RISKS TO THE EXPOSED SEGMENT OF THE POPULATIONS OF MONTICELLO PRIMARILY BY REMOVAL OF SOILS CONTAMINATED WITH GAMMA RADIATION-EMITTING CONTAMINANTS SUCH AS RADIUM-226. THE LONG-TERM RADIOLOGIC RISK TO MONTICELLO RESIDENTS AFTER PERIPHERAL PROPERTY REMEDIATION (EXCEPT FOR AREAS WHERE SUPPLEMENTAL STANDARDS ARE APPLIED) IS ESTIMATED TO BE BACKGROUND. AS FOR OPERABLE UNIT I, THE SELECTED REMEDY WILL NOT POSE UNACCEPTABLE

SHORT-TERM RISKS AND WILL DECREASE CROSS-MEDIA IMPACTS.

COMPLIANCE WITH APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

UNDER SECTION 121(D)(1) OF THE COMPREHENSIVE ENVIRONMENTAL RESPONSE, COMPENSATION, AND LIABILITY ACT, (42 USC. SS (D)(1)), REMEDIAL ACTIONS MUST ATTAIN A DEGREE OF CLEAN UP WHICH ASSURES PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT. ADDITIONALLY, REMEDIAL ACTIONS THAT LEAVE ANY HAZARDOUS SUBSTANCE, POLLUTANT, OR CONTAMINANT ON SITE MUST MEET A LEVEL OR STANDARD OF CONTROL THAT AT LEAST ATTAINS STANDARDS, REQUIREMENTS, LIMITATIONS, OR CRITERIA THAT ARE "APPLICABLE OR RELEVANT AND APPROPRIATE" UNDER THE CIRCUMSTANCES OF THE RELEASE.

"APPLICABLE" REQUIREMENTS ARE THOSE CLEAN-UP STANDARDS, STANDARDS OF CONTROL AND OTHER SUBSTANTIVE ENVIRONMENTAL PROTECTION REQUIREMENTS, CRITERIA, OR LIMITATIONS PROMULGATED UNDER FEDERAL OR STATE LAW THAT SPECIFICALLY ADDRESS A HAZARDOUS SUBSTANCE, POLLUTANT OR CONTAMINANT, REMEDIAL ACTION, LOCATION, OR OTHER CIRCUMSTANCE AT A REMEDIAL ACTION SITE. "RELEVANT AND APPROPRIATE" REQUIREMENTS ARE CLEAN-UP STANDARDS, STANDARDS OF CONTROL AND OTHER SUBSTANTIVE ENVIRONMENTAL PROTECTION

REQUIREMENTS, CRITERIA, OR LIMITATIONS PROMULGATED UNDER FEDERAL OR STATE LAW THAT, WHILE NOT "APPLICABLE" TO A HAZARDOUS SUBSTANCE, POLLUTANT, CONTAMINANT, REMEDIAL ACTION, LOCATION, OR OTHER CIRCUMSTANCE AT A REMEDIAL ACTION SITE, ADDRESS PROBLEMS OR SITUATIONS SUFFICIENTLY SIMILAR TO THOSE ENCOUNTERED AT THE SITE THAT THEIR USE IS WELL-SUITED TO THE PARTICULAR SITE. SEE THE NATIONAL CONTINGENCY PLAN (40 CFR SECTION 300.6) FOR FURTHER INFORMATION.

THERE ARE THREE TYPES OF REQUIREMENTS GOVERNING REMEDIAL ACTIONS. THE FIRST TYPE INCLUDES "CONTAMINANT-SPECIFIC" REQUIREMENTS WHICH SET LIMITS ON CONCENTRATIONS OF SPECIFIC HAZARDOUS SUBSTANCES, POLLUTANTS, AND CONTAMINANTS IN THE ENVIRONMENT. AN APPROPRIATE EXAMPLE OF THIS TYPE OF REQUIREMENT FOR THE MONTICELLO MILL TAILINGS SITE IS THE 40 CFR PART 192 CLEAN UP STANDARD FOR RESIDUAL RADIOACTIVE MATERIALS. THE SECOND TYPE OF REQUIREMENT INCLUDES LOCATION-SPECIFIC REQUIREMENTS THAT SET RESTRICTIONS ON CERTAIN TYPES OF ACTIVITIES BASED ON SITE CHARACTERISTICS. THESE INCLUDE RESTRICTIONS ON ACTIVITIES IN WETLANDS, FLOODPLAINS, AND HISTORIC SITES. THE THIRD TYPE OF REQUIREMENT INCLUDES ACTION-SPECIFIC REQUIREMENTS. THESE ARE TECHNOLOGY-BASED RESTRICTIONS WHICH ARE TRIGGERED BY THE TYPE OF ACTION UNDER CONSIDERATION. OCCUPATIONAL SAFETY AND HEALTH ACT STANDARDS WHICH REGULATE WORKER HEALTH AND SAFETY ARE ACTION-SPECIFIC REQUIREMENTS.

IN DETERMINING WHETHER REQUIREMENTS ARE "RELEVANT AND APPROPRIATE", THE ENVIRONMENTAL PROTECTION AGENCY AND THE STATE OF UTAH HAVE LOOKED AT THE REMEDIAL ACTIONS PROPOSED, THE HAZARDOUS SUBSTANCES PRESENT, THE WASTE CHARACTERISTICS, THE PHYSICAL CHARACTERISTICS OF THE SITE, THE POPULATION AT RISK, AND OTHER APPROPRIATE FACTORS. THE ENVIRONMENTAL PROTECTION AGENCY AND THE STATE OF UTAH REVIEWED FEDERAL AND STATE LAWS, STANDARDS, REQUIREMENTS, CRITERIA AND LIMITATIONS FOR POSSIBLE

APPLICATION TO THE MONTICELLO MILL TAILINGS SITE. TABLES 1.3 AND 1.7 IN THE FEASIBILITY STUDY IDENTIFY THE POTENTIAL REQUIREMENTS SCREENED BY THE ENVIRONMENTAL PROTECTION AGENCY AND THE STATE. TABLE B-1 IN APPENDIX B IDENTIFIES THOSE WHICH HAVE BEEN DETERMINED TO BE "APPLICABLE" OR "RELEVANT AND APPROPRIATE". THE ENVIRONMENTAL PROTECTION AGENCY HAS DETERMINED THAT THERE ARE NO APPLICABLE OR RELEVANT AND APPROPRIATE PUBLIC HEALTH AND ENVIRONMENTAL REQUIREMENTS OF FEDERAL OR STATE LAWS THAT THE SELECTED REMEDIES FOR OPERABLE UNIT I AND II (MILLSITE AND TAILINGS, AND PERIPHERAL PROPERTIES, RESPECTIVELY) WILL NOT MEET, AND THEREFORE NO SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT SECTION 121(D)(4) WAIVERS WOULD BE INVOLVED.

A BRIEF DISCUSSION OF THE PRINCIPAL APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS FOR OPERABLE UNITS I AND II AND HOW THE REMEDIES WILL SATISFY THE REQUIREMENTS FOLLOWS:

CONTAMINANT-SPECIFIC REQUIREMENTS

THE ENVIRONMENTAL PROTECTION AGENCY STANDARDS FOR REMEDIAL ACTION AT INACTIVE URANIUM PROCESSING SITES, 40 CFR PART 192, IS THE PRINCIPAL

CONTAMINANT-SPECIFIC REQUIREMENT IDENTIFIED FOR THE MONTICELLO MILL TAILINGS SITE, OPERABLE UNITS I AND II.

FOR PROPERTIES CONTAMINATED WITH URANIUM PROCESSING RESIDUES, THESE STANDARDS ESTABLISH LIMITS FOR THE GAMMA RADIATION LEVEL AND ANNUAL AVERAGE RADON DECAY PRODUCT CONCENTRATION IN ANY OCCUPIED OR HABITABLE BUILDING AND FOR THE RADIUM CONCENTRATION IN SOIL ON OPEN LANDS. HOWEVER, THEY ARE NOT DIRECTLY APPLICABLE TO THE MONTICELLO MILL TAILINGS SITE BECAUSE THE STANDARDS APPLY ONLY TO CERTAIN SPECIFICALLY DESIGNATED SITES WHERE URANIUM WAS PROCESSED. THE STANDARDS ARE RELEVANT AND APPROPRIATE TO THE MILLSITE AND PERIPHERAL PROPERTIES FOR THE FOLLOWING REASONS:

* THE MONTICELLO SITE IS AN INACTIVE URANIUM MILL TAILINGS SITE WHICH IS OWNED BY THE FEDERAL GOVERNMENT.

* THE REGULATIONS WERE PROMULGATED TO CONTROL TAILINGS WHICH WERE DISPERSED INTO THE ENVIRONMENT AND POSE A THREAT TO HUMAN HEALTH AND THE ENVIRONMENT. THE INACTIVE MONTICELLO URANIUM MILL TAILINGS SITE IS CHARACTERIZED BY LARGE ABOVE-SURFACE AND SUBSURFACE URANIUM PROCESS RESIDUE/TAILINGS PILES WHICH POSE A DANGER TO THE PUBLIC. DISPERSION OF CONTAMINANTS INTO THE ENVIRONMENT THROUGH AIR, GROUND WATER, AND SURFACE WATER PATHWAYS HAS OCCURRED.

* THE NUMERIC STANDARDS FOR HEALTH AND ENVIRONMENTAL CLEAN UP WOULD BE RELEVANT AND APPROPRIATE FOR CORRECTIVE ACTION. URANIUM AND VANADIUM WERE PROCESSED AT THE SITE, AND IT IS THE GROSS ALPHA, RADIUM-226, RADIUM-228, AND

METALS CONTENT OF URANIUM PROCESSING WASTES THAT ARE REGULATED BY THESE STANDARDS.

* THE REGULATIONS ALLOW FOR SITUATIONS WHERE NUMERICAL STANDARDS MAY BE INAPPROPRIATE AND ALLOW OTHER STANDARDS (SUPPLEMENTAL STANDARDS) TO BE USED FOR REMEDIAL ACTIONS WHERE THE ACTION WOULD PRODUCE ENVIRONMENTAL HARM IN EXCESS OF THE DERIVED HEALTH BENEFITS. THE SUPPLEMENTAL STANDARDS COULD PERTAIN TO THE PROPOSED REMEDIAL ACTION INVOLVING THE CLEAN-UP PORTION OF STEEP SLOPES, AND THE MONTICELLO CEMETERY.

THE SELECTED REMEDY WILL MEET 40 CFR 192, SUBPART A REQUIREMENTS BY PROPER DESIGN OF THE REPOSITORY CELL. DESIGN PARAMETERS OF THE REPOSITORY WILL FOLLOW THE LATEST URANIUM MILL TAILINGS REMEDIAL ACTION PROGRAM GUIDANCE, DEVELOPED TO ASSURE COMPLIANCE WITH 40 CFR 192 PERFORMANCE CRITERIA. REPOSITORY COMPONENTS FINALIZED DURING THE DESIGN PHASE WILL BE CHOSEN TO MEET THE MINIMUM OF 200-YEAR EFFECTIVENESS AND THE DESIRED 1,000-YEAR EFFECTIVENESS REQUIREMENTS, INCLUDING A RADON CAP PLACED ON THE PILE TO MINIMIZE RADON GAS EMANATION. WATER INFILTRATION

THROUGH THE PILE AND EROSION OF THE PILE WILL BE MINIMIZED BY TOP COVER AND SIDE SLOPE DESIGN. THE 40 CFR 192, SUBPART A STANDARDS FOLLOW:

"SUBPART A - STANDARDS FOR THE CONTROL OF RESIDUAL RADIOACTIVE MATERIALS FROM INACTIVE PROCESSING SITES

192.02 STANDARDS

CONTROL SHALL BE DESIGNED TO:

(A) BE EFFECTIVE FOR UP TO ONE THOUSAND YEARS, TO THE EXTENT REASONABLY ACHIEVABLE, AND, IN ANY CASE, FOR AT LEAST 200 YEARS, AND,

(B) PROVIDE REASONABLE ASSURANCE THAT RELEASES OF RADON-222 FROM RESIDUAL RADIOACTIVE MATERIAL TO THE ATMOSPHERE WILL NOT:

(1) EXCEED AN AVERAGE RELEASE RATE OF 20 PICOCURIES PER SQUARE METER PER SECOND, OR

(2) INCREASE THE ANNUAL AVERAGE CONCENTRATION OF RADON-222 IN AIR AT OR ABOVE ANY LOCATION OUTSIDE THE DISPOSAL SITE BY MORE THAN ONE-HALF PICOCURIE PER LITER."

THE REQUIREMENTS OF 40 CFR 192, SUBPART B WILL BE FOLLOWED AS CLEAN-UP STANDARDS FOR PERIPHERAL PROPERTIES AND FOR THE MILLSITE ITSELF. SUBPART C REQUIREMENTS WILL BE FOLLOWED BY THE DEPARTMENT OF ENERGY WHEN PROPOSING THE USE OF SUPPLEMENTAL STANDARDS AT THE MONTICELLO CEMETERY AND DENSELY VEGETATED HILLSIDES ON THE SOUTH SIDE OF MONTEZUMA CREEK. THE SUBPARTS FOLLOW:

"SUBPART B - STANDARDS FOR CLEANUP OF LAND AND BUILDINGS CONTAMINATED WITH RESIDUAL RADIOACTIVE MATERIALS FROM INACTIVE URANIUM PROCESSING SITES

192.12 STANDARDS

REMEDIAL ACTIONS SHALL BE CONDUCTED SO AS TO PROVIDE REASONABLE ASSURANCE THAT, AS A RESULT OF RESIDUAL RADIOACTIVE MATERIALS FROM ANY DESIGNATED PROCESSING SITE:

(A) THE CONCENTRATION OF RADIUM-226 IN LAND AVERAGED OVER ANY AREA OF 100 SQUARE METERS SHALL NOT EXCEED THE BACKGROUND LEVEL BY MORE THAN

(1) 5 PCI/G, AVERAGED OVER THE FIRST 15 CM OF SOIL BELOW THE SURFACE, AND

(2) 15 PCI/G, AVERAGED OVER 15 CM THICK LAYERS OF SOIL MORE THAN 15 CM BELOW THE SURFACE.

(B) IN ANY OCCUPIED OR HABITABLE BUILDING

(1) THE OBJECTIVE OF REMEDIAL ACTION SHALL BE, AND REASONABLE EFFORT SHALL BE MADE TO ACHIEVE, AN ANNUAL AVERAGE (OR EQUIVALENT) RADON DECAY PRODUCT CONCENTRATION (INCLUDING BACKGROUND) THAT SHALL NOT EXCEED 0.03 WL, AND

(2) THE LEVEL OF GAMMA RADIATION SHALL NOT EXCEED THE BACKGROUND LEVEL BY MORE THAN 20 MICROROENTGENS PER HOUR."

SUBPART C - IMPLEMENTATION (SUMMARIZED)

192.21 CRITERIA FOR APPLYING SUPPLEMENTAL STANDARDS

THE IMPLEMENTING AGENCIES MAY APPLY STANDARDS IN LIEU OF THE STANDARDS OF SUBPARTS A OR B IF CERTAIN CIRCUMSTANCES EXIST, AS DEFINED IN 192.21.

192.22 SUPPLEMENTAL STANDARDS

"FEDERAL AGENCIES IMPLEMENTING SUBPARTS A AND B MAY IN LIEU THEREOF PROCEED PURSUANT TO THIS SECTION WITH RESPECT TO GENERIC OR INDIVIDUAL SITUATIONS MEETING THE ELIGIBILITY REQUIREMENTS OF 192.21."

(A) "...THE IMPLEMENTING AGENCIES SHALL SELECT AND PERFORM REMEDIAL ACTIONS THAT COME AS CLOSE TO MEETING THE OTHERWISE APPLICABLE STANDARDS AS IS REASONABLE UNDER THE CIRCUMSTANCES."

(B) "...REMEDIAL ACTIONS SHALL, IN ADDITION TO SATISFYING THE STANDARDS OF SUBPARTS A AND B, REDUCE OTHER RESIDUAL RADIOACTIVITY TO LEVELS THAT ARE AS LOW AS IS REASONABLY ACHIEVABLE."

(C) "THE IMPLEMENTING AGENCIES MAY MAKE GENERAL DETERMINATIONS CONCERNING REMEDIAL ACTIONS UNDER THIS SECTION THAT WILL APPLY TO ALL LOCATIONS WITH SPECIFIED CHARACTERISTICS, OR THEY MAY MAKE A DETERMINATION FOR A SPECIFIC LOCATION; THE DEPARTMENT OF ENERGY SHALL INFORM ANY PRIVATE OWNERS AND OCCUPANTS OF THE AFFECTED LOCATION AND SOLICIT THEIR COMMENTS. THE DEPARTMENT OF ENERGY SHALL PROVIDE ANY SUCH COMMENTS TO THE OTHER IMPLEMENTING AGENCIES (AND) SHALL ALSO PERIODICALLY INFORM THE ENVIRONMENTAL PROTECTION AGENCY OF BOTH GENERAL AND INDIVIDUAL DETERMINATIONS UNDER THE PROVISIONS OF THIS SECTION."

PROTECTION OF GROUND WATER IS ALSO PROVIDED FOR IN 40 CFR PART 192 (A)(2) AND (3). THE DEPARTMENT OF ENERGY HAS AGREED TO COMPLY WITH THE "PROPOSED STANDARDS FOR REMEDIAL ACTION AT INACTIVE URANIUM MILL PROCESSING SITES WITH GROUND WATER CONTAMINATION" (52 FR 36000, SEPTEMBER 24, 1987). ALTHOUGH NEITHER APPLICABLE OR RELEVANT AND APPROPRIATE, THESE STANDARDS ARE "TO BE CONSIDERED" AND ARE FURTHER DISCUSSED IN SECTION 10.2.5.

A SECOND CONTAMINANT-SPECIFIC REQUIREMENT FOR THE MONTICELLO MILL TAILINGS SITE IS THE CLEAN AIR ACT, NATIONAL EMISSION STANDARD FOR

HAZARDOUS AIR POLLUTANTS (40 CFR PART 61, SUBPART Q, SECTION 61.192) WHICH SETS STANDARDS FOR EMISSIONS OF RADON-222 INTO THE AIR FROM STORAGE AND DISPOSAL FACILITIES FOR RADIUM-CONTAINING MATERIAL. NO SOURCE AT A DEPARTMENT OF ENERGY FACILITY SHALL EMIT MORE THAN 20 PCI/M2-S (PER UNIT OF TIME) OF RADON-222 AS AN AVERAGE FOR THE ENTIRE SOURCE. THIS IS AN APPLICABLE REQUIREMENT FOR THE MONTICELLO MILL TAILINGS SITE, AT THE EXISTING MILLSITE TAILINGS PILES AND AT THE NEW TAILINGS REPOSITORY. THE RADON BARRIER FOR THE REPOSITORY WILL BE DESIGNED TO MEET THE RADON EMANATION REQUIREMENTS. A COMPLIANCE AGREEMENT BETWEEN THE ENVIRONMENTAL PROTECTION AGENCY, THE STATE OF UTAH, AND THE DEPARTMENT OF ENERGY WILL BE NEGOTIATED DURING REMEDIAL DESIGN TO MEET THE REQUIREMENTS OF THIS REGULATION.

THE STATE OF UTAH'S STANDARDS FOR QUALITY FOR WATERS OF THE STATE (TITLE 26, CHAPTER 11, UCA R448-2 UAC) AND THE UTAH POLLUTION DISCHARGE ELIMINATION SYSTEM (TITLE 26 CHAPTER 11, UCA, R448-8 UAC) ARE APPLICABLE TO ANY SURFACE WATERS DISCHARGED FROM THE SITE. FOR OPERABLE UNIT I, THIS WILL INCLUDE SURFACE WATER DISCHARGES RESULTING FROM THE DEWATERING OF TAILINGS, PORE WATER FROM CONTAMINATED SOILS, WATER COLLECTED IN THE REPOSITORY (DISPOSAL CELL) DURING CONSTRUCTION OR PLACEMENT OF THE TAILINGS AND/OR OTHER SURFACE WATERS COLLECTED ON SITE. ANY OF THESE WASTE WATERS ENTERING MONTEZUMA CREEK SHALL BE TREATED TO COMPLY WITH THE DISCHARGE REQUIREMENTS AND TO MEET THE WATER QUALITY STANDARDS.

THE UTAH OCCUPATIONAL SAFETY AND HEALTH STANDARDS (TITLE 35, CHAPTER 9, UCA, R 500, UAC) ESTABLISH, IMPLEMENT, AND ENFORCE OCCUPATIONAL HEALTH AND SAFETY STANDARDS SIMILAR TO THE FEDERAL REGULATIONS. THE STATE REQUIREMENTS INCORPORATE THE RADIATION EXPOSURE LIMITS PROMULGATED IN 10 CFR PART 20. THESE STANDARDS ARE APPLICABLE TO ALL WORK ACTIVITIES INVOLVED IN THE REMEDIATION OF OPERABLE UNITS I AND II.

LOCATION-SPECIFIC REQUIREMENTS

PHYSICAL CHARACTERISTICS OF THE MONTICELLO MILL TAILINGS SITE INFLUENCE THE TYPE AND LOCATION OF REMEDIAL RESPONSES CONSIDERED FOR OPERABLE UNITS I AND II. THE LOCATION-SPECIFIC REQUIREMENTS IDENTIFIED FOR THE SITE (SEE APPENDIX B) ESTABLISH CONSULTATION PROCEDURES WITH FEDERAL AND STATE AGENCIES AND MAY IMPOSE CONSTRAINTS ON THE LOCATION OF REMEDIAL MEASURES OR MAY REQUIRE MITIGATION MEASURES. LOCATION-SPECIFIC REQUIREMENTS FOR OPERABLE UNITS I AND II RELATE TO HISTORIC PRESERVATION, FISH AND WILDLIFE, WETLANDS/FLOODPLAINS, FARMLANDS, AND WORK IN NAVIGABLE WATERS.

BOTH FEDERAL AND STATE LAWS PROVIDE FOR PROTECTION OF HISTORICAL RESOURCES. THERE MAY BE SITES ELIGIBLE FOR FEDERAL OR STATE HISTORICAL REGISTERS. ALL REGULATIONS RELATING TO HISTORIC PRESERVATION WILL BE FOLLOWED. PRIOR TO DISTURBING PERIPHERAL PROPERTIES, THE STATE WILL BE NOTIFIED, AND THE RESULTS OF ARCHAEOLOGICAL SURVEYS PERFORMED BY THE DEPARTMENT OF ENERGY WILL BE DISCUSSED TO DETERMINE ANY MITIGATION NECESSARY.

WETLANDS AND FLOODPLAIN REQUIREMENTS WILL BE APPLICABLE FOR BOTH OPERABLE UNIT I AND OPERABLE UNIT II. THE TAILINGS PILES AND THE FORMER MILLSITE ARE IN THE FLOODPLAIN OF MONTEZUMA CREEK AND THE CORPS OF ENGINEERS HAS IDENTIFIED WETLANDS ALONG MONTEZUMA CREEK. AGENCY POLICY AND GUIDANCE FOR CARRYING OUT THE PROVISIONS OF EXECUTIVE ORDER 11988 "FLOODPLAIN MANAGEMENT" AND 11990 "PROTECTION OF WETLANDS" HAVE BEEN PROMULGATED IN 40 CFR PART 6 "APPENDIX A".

THE DEPARTMENT OF ENERGY HAS PERFORMED A FLOODPLAIN/WETLANDS ASSESSMENT, IN ACCORDANCE WITH 10 CFR 1022, "COMPLIANCE WITH FLOODPLAIN/WETLANDS ENVIRONMENTAL REVIEW REQUIREMENTS," THE RESULTS OF WHICH ARE INCLUDED IN THE FEASIBILITY STUDY, APPENDIX B. MITIGATION FOR FLOODPLAIN/WETLANDS AREAS WHERE IMPACT IS UNAVOIDABLE INCLUDE REVEGETATION AND REPLACEMENT OF SOIL WHERE REMOVED. FOLLOWING DIVERSION OF MONTEZUMA CREEK DURING MILLSITE REMEDIATION, THE CREEK WILL BE RETURNED TO ITS PRE-MILLSITE HISTORIC CHANNEL, THE CHANNEL WILL BE VEGETATED WITH WETLAND SPECIES, REVETMENTS WILL BE ADDED TO PREVENT BANK EROSION, AND THE STREAM BOTTOM WILL BE MODIFIED WITH ROCK RIFFLE/POOL STRUCTURES TO ENHANCE AQUATIC HABITAT.

THE FARMLAND PROTECTION POLICY ACT (7 CFR PART 658) IDENTIFIES STANDARDS AND CRITERIA FOR IDENTIFYING AND TAKING INTO ACCOUNT ADVERSE IMPACTS ON SIGNIFICANT/IMPORTANT AGRICULTURAL LANDS. THE US SOIL CONSERVATION SERVICE HAS STATED IN A LETTER DATED 4, JUNE 1990, THAT THE PROPOSED REPOSITORY LOCATION DOES NOT MEET THE REQUIREMENTS OF PRIME, UNIQUE OR IMPORTANT FARMLAND. PERIPHERAL PROPERTIES WILL ALSO BE EVALUATED TO DETERMINE IF SIGNIFICANT/IMPORTANT AGRICULTURAL LANDS EXIST. THE ACT'S REQUIREMENTS WILL BE FOLLOWED TO MITIGATE ANY ADVERSE IMPACTS TO THESE AREAS. OTHER LOCATION-SPECIFIC STANDARDS ARE IDENTIFIED IN APPENDIX B.

ACTION-SPECIFIC REQUIREMENTS

ACTION-SPECIFIC REQUIREMENTS ARE TECHNOLOGY-BASED RESTRICTIONS TRIGGERED BY SPECIFIC TYPES OF REMEDIAL MEASURES UNDER CONSIDERATION. ONCE THE REMEDIAL ACTION ALTERNATIVES WERE DEVELOPED FOR OPERABLE UNITS I AND II IN THE FEASIBILITY STUDY, THE ENVIRONMENTAL PROTECTION AGENCY AND THE STATE OF UTAH IDENTIFIED ACTION-SPECIFIC REQUIREMENTS WHICH WERE APPLICABLE OR RELEVANT AND APPROPRIATE TO THE REMEDIES CONSIDERED. THE URANIUM MILL TAILINGS RADIATION CONTROL ACT AND IMPLEMENTING REGULATIONS AT 40 CFR 192, AND THE OCCUPATIONAL SAFETY AND HEALTH ACT AND IMPLEMENTING REGULATIONS AT 29 CFR 1910.96 AND 1926.58, DOUBLE AS ACTION-SPECIFIC REQUIREMENTS FOR THE MILLSITE AND PERIPHERAL PROPERTIES. COMPLIANCE WITH THESE REGULATIONS WAS DISCUSSED IN SECTION 10.2.1. APPENDIX B IDENTIFIES ALL ACTION-SPECIFIC REQUIREMENTS WHICH HAVE BEEN IDENTIFIED FOR THE SELECTED REMEDIES FOR OPERABLE UNITS I AND II.

"TO BE CONSIDERED" REQUIREMENTS

IN ADDITION TO THE REQUIREMENTS MENTIONED ABOVE, THE ENVIRONMENTAL

PROTECTION AGENCY CONSIDERED OTHER FEDERAL AND STATE CRITERIA, ADVISORIES, AND GUIDANCE IN DETERMINING THE APPROPRIATE DEGREE OF CLEAN UP FOR THE MONTICELLO MILL TAILINGS SITE. THE FOLLOWING REQUIREMENTS ARE NOT "APPLICABLE" OR "RELEVANT AND APPROPRIATE", BUT HAVE BEEN AGREED TO BY THE DEPARTMENT OF ENERGY, ENVIRONMENTAL PROTECTION AGENCY, AND THE STATE OF UTAH AS "TO BE CONSIDERED" WHEN DETERMINED TO BE PERTINENT TO THE CLEAN UP AT THE MONTICELLO MILL TAILINGS SITE, OPERABLE UNITS I AND II.

* GUIDANCE ON DESIGNING THE REPOSITORY (URANIUM MILL TAILINGS REMEDIAL ACTION PROGRAM RESEARCH AND PRACTICE), INCLUDING THE LATEST REVISION OF THE TECHNICAL APPROACH DOCUMENT;

AS DISCUSSED ABOVE, GUIDANCE DEVELOPED BY THE DEPARTMENT OF ENERGY AND THE NUCLEAR REGULATORY COMMISSION TO ASSIST IN MEETING THE REQUIREMENTS OF 40 CFR 192, SUBPART A, WILL BE FOLLOWED DURING REPOSITORY DESIGN ACTIVITIES.

* GUIDANCE ESTABLISHING STANDARDS AND REQUIREMENTS FOR THE DEPARTMENT OF ENERGY AND ITS CONTRACTORS WITH RESPECT TO PROTECTION OF THE PUBLIC HEALTH AND ENVIRONMENT AGAINST RADIATION (DEPARTMENT OF ENERGY ORDER 5480.1);

AS WITH OCCUPATIONAL HEALTH AND SAFETY STANDARDS, DEPARTMENT OF ENERGY REQUIREMENTS FOR PROTECTION OF THE PUBLIC AND THE ENVIRONMENT AGAINST RADIATION WILL BE ENFORCED DURING ALL REMEDIATION ACTIVITIES. COMPLIANCE WILL BE MONITORED APPROPRIATELY.

* RADIOLOGIC PROTECTION GUIDELINES (HOT-SPOT CRITERIA) FOR

CLEAN UP OF RESIDUAL RADIOACTIVE MATERIAL AND MANAGEMENT OF THE RESULTANT WASTES AND RESIDUES (US DEPARTMENT OF ENERGY GUIDELINES FOR RESIDUAL RADIOACTIVE MATERIAL AT FORMERLY UTILIZED SITES REMEDIAL ACTION PROGRAM AND REMOTE SURPLUS FACILITIES MANAGEMENT PROGRAM (REVISION 2, MARCH 1987))";

THE DEPARTMENT OF ENERGY'S HOT-SPOT CRITERIA WILL BE USED FOR BOTH OPERABLE UNITS I AND II WHEN SURFACE OR SUBSURFACE SOIL CONCENTRATIONS IN A SPECIFIED AREA EXCEED THE 40 CFR 192.12 STANDARDS BY A CERTAIN FACTOR. THE APPROACH FOR DETERMINING THE SITE-SPECIFIC HOT-SPOT CRITERIA, REFERRED TO ABOVE, WILL BE FOLLOWED.

* "PROPOSED STANDARDS FOR REMEDIAL ACTION AT INACTIVE URANIUM PROCESSING SITES WITH GROUND WATER CONTAMINATION" (52 FR 36000, SEPTEMBER 24, 1987) WILL REPLACE EXISTING GROUND WATER PROTECTION STANDARDS AT 40 CFR 192.20 (A)(2) AND (3). IT REQUIRES CLEAN UP OF CONTAMINATION THAT OCCURRED BEFORE THE TAILINGS ARE STABILIZED AND ALSO REQUIRES THAT TAILINGS BE STABILIZED AND CONTROLLED IN A

MANNER THAT ELIMINATES OR MINIMIZES THE CONTAMINATION OF GROUND WATER. THE PROPOSED STANDARDS SPECIFY THAT REMEDIAL ACTIONS AT PROCESSING SITES WILL COMPLY WITH 40 CFR PART 264, SECTIONS 264.93, HAZARDOUS CONSTITUENTS, AND 264.94, CONCENTRATION LIMITS. TABLE 1 IN SECTION 264.93 IDENTIFIES THE CONSTITUENTS AND THE MAXIMUM CONCENTRATION LIMITS ALLOWABLE. IN ADDITION TO THOSE CONSTITUENTS LISTED IN 264.93, THE PROPOSED RULE INCLUDES CONCENTRATION LIMITS FOR MOLYBDENUM, NITRATE, COMBINED RADIUM-226 AND RADIUM-228, AND COMBINED URANIUM-234 AND URANIUM-238. THE LIMITS FOR OTHER CONSTITUENTS ARE SET AT THEIR BACKGROUND LEVEL IN GROUND WATER AT THE REGULATED UNIT.

DURING THE REMEDIAL DESIGN PHASE FOR OPERABLE UNIT I, A MONITORING PROGRAM WILL BE DEVELOPED TO EVALUATE BACKGROUND CONCENTRATIONS FOR GROUND WATER COMPLIANCE PURPOSES AND TO MONITOR REPOSITORY PERFORMANCE WITH RESPECT TO GROUND WATER CONTAMINATION. THE PROGRAM WILL ASSESS CELL INTEGRITY BY MONITORING COMPLIANCE WITH SPECIFIC GROUND WATER CONSTITUENTS, DETERMINED IN ACCORDANCE WITH THE PROPOSED REGULATIONS. IN ACCORDANCE WITH THE PROPOSED RULE, CORRECTIVE ACTION WOULD BE INVOKED IF NONCOMPLIANCE WITH THE GROUND WATER STANDARDS OCCURS.

COST EFFECTIVENESS

THE SELECTED REMEDY IS COST-EFFECTIVE BECAUSE IT HAS BEEN DETERMINED TO PROVIDE OVERALL EFFECTIVENESS PROPORTIONAL TO ITS COSTS. THE SELECTED REMEDY FOR EACH OPERABLE UNIT REPRESENTS THE MOST COST-EFFECTIVE ALTERNATIVE OF THE ALTERNATIVES EVALUATED IN THE FEASIBILITY STUDY, WHERE COST-EFFECTIVENESS IS DEFINED AS THE REDUCTION IN THREAT TO PUBLIC HEALTH AND THE ENVIRONMENT PER DOLLARS EXPENDED.

THE ESTIMATED COST OF THE SELECTED ALTERNATIVE FOR OPERABLE UNIT I ($42.3 MILLION) IS APPROXIMATELY 60 PERCENT OF THE COST OF THE OFF-SITE DISPOSAL ALTERNATIVE, BUT PROVIDES THE SAME LEVEL OF LONG-TERM PROTECTION AND INVOLVES FEWER SHORT-TERM RISKS. THE SELECTED ALTERNATIVES FOR OPERABLE UNIT II MAY RANGE IN COST FROM $12.648 MILLION AND $18.460 MILLION, DEPENDING UPON THE REMEDIAL METHOD EMPLOYED FOR SPECIFIC LAND TYPES.

UTILIZATION OF PERMANENT SOLUTIONS AND ALTERNATIVE TREATMENT TECHNOLOGIES TO THE MAXIMUM EXTENT PRACTICABLE AND PREFERENCE FOR TREATMENT AS A PRINCIPAL ELEMENT

THE SELECTED REMEDY DOES NOT EMPLOY TREATMENT OR RESOURCE RECOVERY TECHNOLOGIES. ALTHOUGH SEVERAL TREATMENT TECHNOLOGIES WERE EVALUATED DURING THE PROCESS OF DEVELOPING ALTERNATIVES FOR THE SITE, MOST OF THEM WERE FOUND TO BE EITHER TECHNICALLY UNFEASIBLE OR INADEQUATELY TESTED FOR USE WITH RADIOLOGIC CONTAMINANTS UNDER CONDITIONS IN EXISTENCE AT THE SITE. NONE OF THE AVAILABLE TREATMENT TECHNOLOGIES WOULD PERMANENTLY REDUCE THE TOXICITY OF RADIOLOGIC CONTAMINANTS BY REDUCING

THEIR MASS. TREATMENT TECHNOLOGIES THAT WOULD RESULT IN A REDUCTION IN VOLUME REQUIRE HANDLING AND DISPOSAL OF RESIDUALS THAT COULD PRESENT ADDITIONAL HEALTH RISKS TO WORKERS OR THE ENVIRONMENT, AND WERE NOT AS COST-EFFECTIVE AS THE SELECTED ALTERNATIVES. TREATMENT TECHNOLOGIES THAT COULD RESULT IN A REDUCTION IN MOBILITY WERE EITHER UNTESTED OR WERE NOT COST-EFFECTIVE.

THE SELECTED REMEDY WILL REDUCE HUMAN HEALTH RISKS TO THE MAXIMUM EXTENT PRACTICABLE FOR THE MONTICELLO MILL TAILINGS SITE, WITH MAXIMUM SHORT-TERM EFFECTIVENESS. THE SELECTED REMEDY EMPLOYS WELL-ACCEPTED AND EASILY IMPLEMENTABLE TECHNIQUES AND WOULD ACHIEVE MAXIMUM COST-EFFECTIVENESS.

#RS
RESPONSIVENESS SUMMARY

OVERVIEW

THIS RESPONSIVENESS SUMMARY RESPONDS TO COMMENTS RECEIVED DURING THE PUBLIC COMMENT PERIOD ON THE REMEDIAL INVESTIGATION/FEASIBILITY STUDY (RI/FS) AND PROPOSED PLAN FOR THE US DEPARTMENT OF ENERGY'S MONTICELLO (UTAH) MILL TAILINGS SUPERFUND SITE REMEDIAL ACTION PROJECT. IT SHOULD BE NOTED THAT REFERENCE IS OFTEN MADE TO THIS PROJECT AS THE MONTICELLO REMEDIAL ACTION PROJECT, OR MRAP, AS IT IS TITLED UNDER DOE'S SURPLUS FACILITIES MANAGEMENT PROGRAM. THE MONTICELLO MILLSITE RI/FS AND PROPOSED PLAN WERE AVAILABLE TO THE PUBLIC FOR COMMENT FROM OCTOBER 27 THROUGH NOVEMBER 25, 1989. THE COMMENT PERIOD WAS EXTENDED UNTIL DECEMBER 19, 1989 TO ACCOMMODATE ADDITIONAL COMMENTS.

AT THE TIME OF THE PUBLIC COMMENT PERIOD, THE US DEPARTMENT OF ENERGY (DOE) HAD PROPOSED PREFERRED ALTERNATIVES FOR THE THREE OPERABLE UNITS (OUS) OF THE MONTICELLO REMEDIAL ACTION PROJECT. THE PROPOSED PREFERRED REMEDIAL ACTION ALTERNATIVE FOR OPERABLE UNIT I (TAILINGS) WOULD BE TO REMOVE THE APPROXIMATELY 2 MILLION CUBIC YARDS OF TAILINGS FROM THE MILLSITE, THE PERIPHERAL PROPERTIES, AND THE VICINITY PROPERTIES AND RELOCATE THEM TO A DESIGNED DISPOSAL CELL AT A SITE SOUTH OF THEIR PRESENT LOCATION.

BASED UPON THE VERBAL COMMENTS RECEIVED DURING THE PUBLIC MEETING, THE RESIDENTS AND CITY OF MONTICELLO HAVE NO OBJECTIONS TO THE PROPOSED PREFERRED ALTERNATIVE FOR OU I. WRITTEN COMMENTS RECEIVED DURING THE PUBLIC COMMENT PERIOD INDICATE THE UMETCO MINERALS CORPORATION, BOULDEN CONTRACTING COMPANY, RIO ALGOM MINING CORPORATION, AND ECOLOGY AND ENVIRONMENT, INC. PREFER THE SECOND ALTERNATIVE FOR OU I, REMOVAL OF TAILINGS TO A LICENSED REPOSITORY. HOWEVER, THE STATE OF UTAH BUREAU OF RADIATION CONTROL HAS INDICATED THAT CURRENT STATE POLICY DOES NOT ALLOW THE DISPOSAL OF COMPREHENSIVE ENVIRONMENTAL RESPONSE, COMPENSATION, AND LIABILITY ACT (CERCLA) MATERIALS AT NUCLEAR REGULATORY COMMISSION (NRC) DISPOSAL SITES. TWO LOCAL RANCHERS SUGGESTED THAT LAND CURRENTLY OWNED

BY THE GOVERNMENT BE USED INSTEAD OF PURCHASING ADDITIONAL PRIVATE LAND FOR THE SOUTH SITE LOCATION. WRITTEN COMMENTS FROM RIO ALGOM MINING CORPORATION QUESTIONED THE COST DIFFERENCES BETWEEN ALTERNATIVES 1 AND 2 AND REQUESTED A CLARIFICATION OF THOSE CALCULATIONS. IN ADDITION, THE US ENVIRONMENTAL PROTECTION AGENCY REGION VIII (EPA) AND THE STATE OF UTAH (STATE) HAVE SUBMITTED WRITTEN QUESTIONS REGARDING ENGINEERING DESIGN OF THE PREFERRED ALTERNATIVE FOR OU I.

THE PROPOSED PREFERRED ALTERNATIVE FOR OPERABLE UNIT II (PERIPHERAL PROPERTIES) IS TO USE A COMBINATION OF CONVENTIONAL CONSTRUCTION AND ENVIRONMENTALLY SENSITIVE CONSTRUCTION METHODS FOR CLEAN UP TO THE 40 CFR 192.12 STANDARDS DEPENDING ON THE NATURE OF THE CONTAMINATION AND THE TYPE OF LAND. SUPPLEMENTAL STANDARDS (LEAVING SOME OR ALL OF THE CONTAMINATION IN PLACE) COULD POTENTIALLY BE APPLIED IN SPECIFIC AREAS WHERE THE CLEAN UP WOULD CAUSE EXCESSIVE ENVIRONMENTAL DAMAGE IN COMPARISON TO THE DERIVED ENVIRONMENTAL AND HEALTH BENEFITS.

NO WRITTEN CONCERNS WERE EXPRESSED RELATIVE TO THE PROPOSED REMEDIAL ACTION FOR THE PERIPHERAL PROPERTIES. ONE COMMENT EXPRESSED AT THE PUBLIC MEETING BY AN EMPLOYEE OF THE CITY OF MONTICELLO REQUESTED CLARIFICATION OF THE PROPOSED USE OF SUPPLEMENTAL STANDARDS AT THE CEMETERY.

THE DEPARTMENT OF ENERGY'S PROPOSED PREFERRED ALTERNATIVE AT THE TIME OF THE PUBLIC COMMENT PERIOD FOR OPERABLE UNIT III (GROUND WATER) WAS TO REMOVE THE SOURCE OF THE CONTAMINATION (MILL TAILINGS) AND TO ALLOW PASSIVE RESTORATION OF THE GROUND WATER. PASSIVE RESTORATION WOULD ENTAIL NATURAL FLUSHING OF THE ALLUVIAL AQUIFER OVER A 60-YEAR TIME PERIOD WITH INSTITUTIONAL CONTROLS TO LIMIT ACCESS TO GROUNDWATER USE. THE STATE AND EPA SUBMITTED WRITTEN COMMENTS REGARDING THE TECHNICAL

ASPECTS OF PASSIVE RESTORATION.

WRITTEN COMMENTS FROM BOULDEN CONTRACTING COMPANY, THE RIO ALGOM MINING CORPORATION AND ECOLOGY AND ENVIRONMENT, INC. SUPPORTED MORE ACTIVE GROUND WATER TREATMENT METHODS AND A REDUCTION OF THE TIME-SPAN FOR GROUND WATER CLEAN UP. THE SOUTHEASTERN UTAH DISTRICT HEALTH DEPARTMENT EXPRESSED CONCERN THAT PRESENT AND FUTURE DOWNSTREAM USES OF MONTEZUMA CREEK WATER HAD NOT BEEN FULLY TAKEN INTO CONSIDERATION AND PROPOSED THAT THE FINAL CLEAN-UP PLAN INCORPORATE A SUITABLE MEASURE OF HEALTH PROTECTION FOR ALL PRESENT AND POTENTIAL USERS.

SINCE THIS TIME, EPA, THE STATE OF UTAH, AND DOE, HAVE AGREED TO EVALUATE REMEDIAL ACTION ALTERNATIVES FOR GROUND WATER AND SURFACE WATER FOLLOWING COMPLETION OF REMEDIAL ACTION FOR OPERABLE UNITS I AND II. THIS APPROACH IS PRESENTED IN THE RECORD OF DECISION.

MORE DETAILED RESPONSES TO VERBAL AND WRITTEN COMMENTS RECEIVED DURING THE PUBLIC COMMENT PERIOD APPEAR IN SECTION 3.0, SUMMARY OF COMMENTS RECEIVED DURING THE PUBLIC COMMENT PERIOD AND AGENCY RESPONSES.

THESE SECTIONS FOLLOW:

* BACKGROUND ON COMMUNITY INVOLVEMENT,

* SUMMARY OF COMMENTS RECEIVED DURING THE PUBLIC COMMENT PERIOD AND AGENCY RESPONSES,

* REMAINING CONCERNS, AND

* ATTACHMENT: COMMUNITY RELATIONS ACTIVITIES FOR THE MONTICELLO MILLSITE SUPERFUND SITE.

BACKGROUND ON COMMUNITY INVOLVEMENT

COMMUNITY RELATIONS ACTIVITIES BY THE US DEPARTMENT OF ENERGY'S GRAND JUNCTION PROJECTS OFFICE HAVE BEEN ONGOING SINCE 1980. A LIST OF COMMUNITY RELATIONS ACTIVITIES IS INCLUDED AS AN ATTACHMENT TO THIS RESPONSIVENESS SUMMARY. CONTACT HAS BEEN PREDOMINANTLY THROUGH PERIODIC BRIEFINGS OF CITY AND COUNTY OFFICIALS, STATE OF UTAH REPRESENTATIVES, LOCAL MEDIA, AND INDIVIDUAL PERIPHERAL PROPERTY OWNERS. PERIODIC PRESS RELEASES AND FACT SHEETS HAVE BEEN ISSUED AND SEVERAL PUBLIC MEETINGS HAVE BEEN CONDUCTED ON MONTICELLO CLEAN-UP ACTIVITIES. COMMUNITY INTEREST IN THE CLEAN UP OF THE MONTICELLO MILLSITE HAS BEEN VERY LOW WITH FEW COMMUNITY CONCERNS EXPRESSED.

THE LOW PUBLIC CONCERN CAN BE ACCOUNTED FOR BY SEVERAL FACTORS:

* LOCAL CITIZENS HAVE LIVED AND WORKED WITH THE URANIUM MINING AND MILLING INDUSTRY SINCE THE EARLY 1940'S. MANY MADE THEIR LIVELIHOOD FROM THOSE INDUSTRIES.

* MOST CITIZENS DO NOT VIEW THE MILL TAILINGS AS A SERIOUS HEALTH HAZARD, AND THE MAJORITY OF THE COMMUNITY IS UNCONCERNED ABOUT THE PRESENCE OF CONTAMINATION.

* INTERIM SITE STABILIZATION HAS BEEN IN PLACE SINCE 1964. THE MILLSITE TAILINGS PILES BLEND INTO THE SURROUNDING TERRAIN AND HAVE NOT BEEN PERCEIVED AS A HAZARD OR EYESORE BY LOCAL RESIDENTS. ROUTINE MONITORING AND MAINTENANCE OF THE MILLSITE TAILINGS HAS BEEN IN PLACE SINCE STABILIZATION.

* WORK HAS BEEN IN PROGRESS AT THE MONTICELLO VICINITY PROPERTIES FOR SEVERAL YEARS AND LOCAL RESIDENTS ARE AWARE THAT DOE IS IN THE PROCESS OF CLEANING UP THE MILL TAILINGS IN THE AREA.

GENERAL COMMUNITY CONCERNS EXPRESSED IN THE PAST HAVE CENTERED ON THE FOLLOWING ISSUES:

SAFETY

* COMMUNITY CONCERNS RELATING TO ANY TYPE OF PROLONGED MILL TAILINGS REMEDIAL ACTION CONSTRUCTION ACTIVITY INCLUDE INCREASED POTENTIAL FOR CAR/TRUCK ACCIDENTS, AND CONCERN THAT SPILLS COULD OCCUR THAT MAY AFFECT THE COMMUNITY AND ENVIRONMENT ALONG THE TRANSPORTATION ROUTE. CITY OFFICIALS HAVE EXPRESSED CONCERN ABOUT ROAD DAMAGE FROM TRUCK TRAFFIC AND THE NEED TO PROVIDE FUNDING FOR ROAD UPGRADING AND ROUTINE REPAIR.

THE PROPOSED PREFERRED ALTERNATIVE FOR OU I IS RELOCATION OF THE TAILINGS PILE OUT OF THE MONTEZUMA CREEK FLOODPLAIN TO AN ON-SITE LOCATION SOUTH OF THE PRESENT SITE. WORKER COMMUTER TRAFFIC TO AND FROM THE SITE WILL INCREASE AS WILL EQUIPMENT HAULAGE BY TRUCK WHEN COMPARED TO THE NORMAL TRAFFIC PATTERNS. THESE EFFECTS WOULD NOT BE EXPECTED TO PRESENT SERIOUS INCONVENIENCES TO THE GENERAL PUBLIC. HEAVIEST MOVEMENT OF EQUIPMENT DURING PILE RELOCATION WOULD BE RESTRICTED TO THE SITE. AN ON-SITE ROAD WOULD BE CONSTRUCTED AND USED DURING THE TAILINGS RELOCATION PROCESS, THUS ELIMINATING HEAVY TRUCK TRAFFIC ON PUBLIC ROADWAYS.

RECENTLY, THE DEPARTMENT OF ENERGY AGREED TO SHARE WITH THE CITY OF MONTICELLO IN THE REPAIR COSTS OF THOSE ROADS USED BY DOE TO MOVE TAILINGS FROM THE VICINITY PROPERTIES TO THE MILLSITE FOR ULTIMATE DISPOSAL.

NOISE/DUST CONTROL

* SOME CONCERN HAS BEEN EXPRESSED ABOUT NOISE AND DUST

IMPACTS ON PROPERTIES CLOSE TO THE MILLSITE DURING REMEDIATION.

NOISE IMPACTS WOULD MOST AFFECT ON-SITE WORKERS. HEARING PROTECTION WILL BE PROVIDED AND IMPACTS ON NEIGHBORING PROPERTIES SHOULD BE NEGLIGIBLE. DUST CONTROL WILL BE EXERCISED DURING REMEDIATION USING ESTABLISHED METHODS AND PROCEDURES.

TOURISM

* MONTICELLO DERIVES SOME INCOME FROM TOURIST TRAFFIC. POTENTIAL LOSS OF TOURIST TRADE DURING REMEDIAL ACTION IS A LOCAL CONCERN.

ANY ECONOMIC LOSS DUE TO DECREASES IN THE TOURIST INDUSTRY SHOULD BE MINIMAL AND SHOULD BE AT LEAST PARTIALLY OFFSET BY INCREASED INCOME TO THE COMMUNITY THROUGH CONTRACTOR PAYROLLS, LODGING AND PURCHASES OF GOODS, ETC. DOE ESTIMATES THAT DURING THE MULTI-YEAR CONSTRUCTION PERIOD, ABOUT 43 JOBS WILL BE FILLED BY LOCAL RESIDENTS, WITH ANOTHER ESTIMATED 83 INDIRECT JOBS BEING CREATED BY THE PROJECT. FURTHERMORE,

IMPLEMENTATION OF THE PROPOSED ALTERNATIVE MINIMIZES HIGHWAY IMPACTS.

SUMMARY OF COMMENTS RECEIVED DURING THE PUBLIC COMMENT PERIOD AND AGENCY RESPONSES

COMMENTS RAISED DURING THE MONTICELLO MILLSITE PUBLIC COMMENT PERIOD ON THE RI/FS AND PROPOSED PLAN ARE SUMMARIZED BRIEFLY BELOW AND AGENCY RESPONSES ARE PROVIDED.

SUMMARY OF QUESTIONS RECEIVED AT THE PUBLIC MEETING ON THE MRAP RI/FS AND PROPOSED PLAN ON NOVEMBER 16, 1989.

THE FOLLOWING IS A SUMMARY OF COMMENTS RECEIVED AND RESPONSES MADE AT THE PUBLIC MEETING HELD IN MONTICELLO, UTAH, ON NOVEMBER 16, 1989. THE TRANSCRIPT FROM THE PUBLIC MEETING IS LOCATED IN THE ADMINISTRATIVE RECORD IN THE SAN JUAN COUNTY LIBRARY AND CONTAINS ALL QUESTIONS ASKED AND FULL RESPONSES MADE DURING THE MEETING.

GENERAL COMMENTS

1) SEVERAL QUESTIONS ASKED FOR CLARIFICATION OF THE DIFFERENCES BETWEEN THE MONTICELLO SITE AND URANIUM MILL TAILINGS REMEDIAL ACTION (UMTRA) SITES.

DOE RESPONSE: UNLIKE UMTRA SITES, THE MONTICELLO MILLSITE WAS OWNED AND OPERATED BY DOE. THEREFORE, IT CANNOT BE REMEDIATED UNDER DOE'S UMTRA PROGRAM. UNLIKE UMTRA PROJECTS, THE STATE DOES NOT SHARE COSTS ON THE MILLSITE PROJECT. DOE IS THE PRINCIPAL RESPONSIBLE PARTY AND BEARS CLEAN-UP COSTS.

2) THE LOCAL PUBLIC AND LOCAL CONTRACTORS WERE INTERESTED IN WHETHER THE PROJECT CAN BE BROKEN DOWN INTO SMALLER UNITS SO THAT LOCAL CONTRACTORS MAY BID ON REMEDIATION ACTIVITIES.

DOE RESPONSE: CERTAIN PHASES OF THE CLEAN-UP ACTIVITIES CAN BE BROKEN DOWN INTO SMALLER UNITS, SUCH AS PERIPHERAL PROPERTIES REMEDIATION AND SITE PREPARATION ACTIVITIES. THERE WILL BE MANY INSTANCES WHERE LOCAL CONTRACTORS WILL BE IN A GOOD POSITION TO PROVIDE CONTRACTING SERVICES.

3) AT THE PUBLIC MEETING A REQUEST WAS MADE BY THE RIO ALGOM MINING CORPORATION TO EXTEND THE PUBLIC COMMENT PERIOD TO JANUARY 5, 1990.

DOE RESPONSE: DOE WAS UNABLE TO RESPOND TO THIS QUESTION DURING THE PUBLIC MEETING BECAUSE THE DECISION WAS EPA'S RESPONSIBILITY. THEREFORE, A RESPONSE IS NOW PROVIDED.

THE PUBLIC COMMENT PERIOD STARTED WITH THE RELEASE OF THE RI/FS AND PROPOSED PLAN ON OCTOBER 27, 1989. ON THAT DATE, THE RI/FS AND THE PROPOSED PLAN WERE PLACED IN THE ADMINISTRATIVE RECORD AT THE INFORMATION REPOSITORY LOCATIONS. ADDITIONAL COPIES WERE SENT TO KEY

CONTACTS. TWO NOTICES OF OPPORTUNITY TO COMMENT WERE PUBLISHED IN THE SAN JUAN RECORD. ON NOVEMBER 16, 1989, DOE, EPA, AND THE STATE HELD A PUBLIC MEETING IN MONTICELLO TO RECEIVE ANY COMMENTS ON THE TWO DOCUMENTS. THE COMMENT PERIOD INITIALLY ALLOWED FOUR WEEKS FOR COMMENT AND WAS SCHEDULED TO END ON NOVEMBER 25, 1989, BUT WAS EXTENDED TO ACCOMMODATE ADDITIONAL COMMENTS. WITH THE EXTENSION, WHICH WAS AGREED TO BY EPA AND THE STATE, THE COMMENT PERIOD ENDED ON DECEMBER 19, 1989. RIO ALGOM MINING WAS ALSO INFORMED BY EPA THAT ANY WRITTEN COMMENTS BY THE COMPANY WOULD BE ACCEPTED FOLLOWING THE CLOSE OF THE PUBLIC COMMENT PERIOD. RIO ALGOM SUBMITTED COMMENTS ON DECEMBER 1, 1989.

4) SEVERAL QUESTIONS RELATED TO THE OVERALL COST OF THE MILLSITE PROJECT AND TO THE LENGTH OF TIME THAT THE PROJECT HAS BEEN "STUDIED".

DOE RESPONSE: CURRENTLY, UNDER DOE'S FIVE-YEAR PLAN WHICH PRIORITIZED CLEAN-UP ACTIVITIES AND ASSOCIATED FUNDING, THE MONTICELLO MILL TAILINGS SITE IS A "PRIORITY ONE" SITE. THE CURRENT COST ESTIMATE OF APPROXIMATELY $65 MILLION FOR CLEAN UP OF THE MILLSITE INCLUDES FEDERAL FACILITY AGREEMENT DEVELOPMENT, RI/FS, NEPA DOCUMENTATION, ETC., AS WELL AS REMEDIAL DESIGN AND REMEDIAL ACTION.

OPERABLE UNIT I - MONTICELLO MILLSITE

1) A LOCAL RESIDENT ASKED WHETHER DOE WOULD RETAIN OWNERSHIP OF THE MILLSITE AREA FOLLOWING REMEDIATION.

DOE RESPONSE: THE SITE WILL HAVE TO BE VERIFIED AS BEING CLEAN AND MUST BE DE-LISTED FROM THE NATIONAL PRIORITY LIST PRIOR TO BEING RELEASED BY THE FEDERAL GOVERNMENT FOR PRIVATE USE OR OWNERSHIP.

2) MANY QUESTIONS WERE ASKED REGARDING THE PROPOSED SOUTH SITE REMEDIAL ACTION ALTERNATIVE, INCLUDING CAP DESIGN, PHYSICAL LOCATION OF THE REPOSITORY, SLOPE CONSIDERATIONS, PHYSICAL SECURITY, ETC.

DOE RESPONSE: GENERAL DETAILS REGARDING REPOSITORY DESIGN HAVE BEEN IDENTIFIED IN THE MONTICELLO MILLSITE RI/FS AND WERE REVIEWED AT THE PUBLIC MEETING. SPECIFIC DETAILS OF REPOSITORY DESIGN, PHYSICAL LOCATION, SECURITY MEASURES, ETC., WILL BE DETERMINED DURING REMEDIAL DESIGN. COMMUNITY RELATIONS ACTIVITIES TO BE PERFORMED DURING REMEDIAL DESIGN INCLUDE ISSUING FACT SHEETS AND PROVIDING A PUBLIC BRIEFING FOLLOWING FINAL DESIGN.

3) THE MAYOR ASKED WHAT RAMIFICATIONS WOULD OCCUR IF THE CITY EXPANDED. RELATED QUESTIONS INVOLVED HOW CLOSE DEVELOPMENT COULD COME TO THE FINAL REPOSITORY AND WHETHER THE PROPOSED REPOSITORY SITE IS WITHIN CURRENT CITY LIMITS.

DOE RESPONSE: THE PROPOSED REPOSITORY SITE IS NOT WITHIN CITY LIMITS. REPOSITORY DESIGN WILL INCLUDE CONCERN FOR AESTHETICS TO THE SURROUNDING COMMUNITY. THE ACCEPTABLE DISTANCE (OR BUFFER ZONE) NEEDED BETWEEN THE

REPOSITORY AND THE LOCAL COMMUNITY WILL VARY ACCORDING TO LAND USE. COMMERCIAL OR INDUSTRIAL USE COULD BE ALLOWED TO TAKE PLACE CLOSER TO THE REPOSITORY THAN RESIDENTIAL DWELLINGS. SPECIFIC ANSWERS WILL BE DEVELOPED DURING REMEDIAL DESIGN.

4) THE REPRESENTATIVE OF AN ENGINEERING FIRM ASKED WHETHER THE SAME DISPOSAL STANDARDS WOULD APPLY TO THE TAILINGS IF HAULED TO A CURRENTLY LICENSED FACILITY.

DOE/STATE OF UTAH RESPONSE: THE STATE RESPONDED THAT CURRENT POLICY ALLOWS NO CERCLA WASTE TO BE DISPOSED OF WITH WASTES AT NRC-LICENSED FACILITIES. BARRING STATE POLICY, THE SAME DISPOSAL STANDARDS WOULD APPLY. THE STATE OF UTAH BUREAU OF RADIATION PROTECTION WOULD TAKE THE LEAD ON ISSUES REGARDING DISPOSAL STANDARDS.

OPERABLE UNIT II - PERIPHERAL PROPERTIES

1) A REPRESENTATIVE FROM THE SOUTHEASTERN UTAH DISTRICT HEALTH DEPARTMENT ASKED FOR EXAMPLES OF SUPPLEMENTAL STANDARDS USAGE.

DOE RESPONSE: ONE AREA WHERE SUPPLEMENTAL STANDARDS HAVE BEEN USED TRADITIONALLY IS FOR UTILITY LINES UNDER PAVEMENT AND SIDEWALK. THEY HAVE ALSO BEEN PROPOSED FOR CEMETERIES.

2) SEVERAL QUESTIONS WERE RAISED REGARDING THE PROPOSED USE OF SUPPLEMENTAL STANDARDS AT THE CEMETERY IN MONTICELLO.

DOE RESPONSE: THE USE OF SUPPLEMENTAL STANDARDS, AS DESCRIBED IN 40 CFR 192, MAY BE PROPOSED FOR THE CEMETERY. PRIOR TO A DECISION BEING MADE TO LEAVE THE TAILINGS IN PLACE UNDER THE SUPPLEMENTAL STANDARDS

PROVISION, DOE WILL PREPARE A DETAILED DOCUMENT FOR STATE AND EPA REVIEW AND CONCURRENCE WHICH EVALUATES ANY IMPACT TO HUMAN HEALTH AND THE ENVIRONMENT.

3) A MONTICELLO RESIDENT ASKED WHETHER THE GOLF COURSE IN MONTICELLO IS CONTAMINATED.

DOE RESPONSE: THE ANSWER GIVEN AT THE PUBLIC MEETING WAS THAT THE GOLF COURSE IS NOT CONTAMINATED. THIS IS IN ERROR. THE GOLF COURSE IS CONTAMINATED WITH MILL TAILINGS AND WILL BE REMEDIATED UNDER THE MONTICELLO VICINITY PROPERTIES PROJECT.

OPERABLE UNIT III - GROUND WATER

A SUMMARY OF QUESTIONS FROM THE MEETING AND AGENCY RESPONSES FOLLOWS. IT SHOULD BE NOTED, HOWEVER, THAT DOE HAS AGREED WITH EPA/AND THE STATE TO POSTPONE EVALUATION OF THE GROUND WATER AND SURFACE WATER UNTIL AFTER REMEDIATION OF THE MILLSITE AND PERIPHERAL PROPERTIES. THEREFORE, ANSWERS TO QUESTIONS REGARDING POTENTIAL GROUND WATER REMEDIAL ACTION ALTERNATIVES ARE PROVIDED, BUT A FOCUSED REMEDIAL

INVESTIGATION/FEASIBILITY STUDY AND RECORD OF DECISION WILL FOLLOW AT A LATER DATE TO DETERMINE THE APPROPRIATE REMEDIAL ACTION.

1) A LOCAL RESIDENT ASKED ABOUT THE DURATION OF PASSIVE RESTORATION AND HOW CLEAN THE GROUND WATER WILL BE AT THAT POINT IN TIME.

DOE RESPONSE: MODELING DONE FOR THE MILLSITE INDICATES THAT IF PASSIVE RESTORATION OF THE GROUND WATER IS CHOSEN AS AN ALTERNATIVE FOR GROUND WATER REMEDIATION, APPROXIMATELY 60 YEARS WOULD BE NEEDED TO REDUCE THE CONTAMINANTS IN THE ALLUVIAL AQUIFER TO ACCEPTABLE LEVELS, BASED ON CURRENT LEVELS OF CONTAMINATION.

2) SEVERAL QUESTIONS WERE ASKED REGARDING HOW FAR THE GROUND WATER PLUME HAS TRAVELED AND HOW FAR IT WILL TRAVEL IN SIXTY YEARS.

DOE RESPONSE: SINCE SEVERAL WRITTEN COMMENTS WERE ALSO RECEIVED ON THE ISSUE, DOE'S RESPONSE IS FOUND IN SECTION 3.3 OF THIS APPENDIX, ON PAGE A-15.

WRITTEN COMMENTS RECEIVED ON THE CERCLA PROCESS

1) EPA REQUESTED ADDITIONAL INFORMATION REGARDING WHY ALL BUT ONE OF THE OFF-SITE ALTERNATIVES WAS ELIMINATED DURING THE PRELIMINARY SCREENING PROCESS.

DOE RESPONSE: THE PRELIMINARY SCREENING PROCESS INVOLVED EVALUATING EACH POTENTIAL REPOSITORY LOCATION WITH RESPECT TO EFFECTIVENESS, IMPLEMENTABILITY, AND COST. THE EVALUATION ALSO INCLUDED AN EVALUATION OF COMPLIANCE WITH THE MAJOR ACTION-SPECIFIC ARAR, 40 CFR 192, "STANDARDS FOR REMEDIAL ACTIONS AT INACTIVE URANIUM PROCESSING SITES".

BASED ON THIS ARAR, 25 SITING CRITERIA WERE ESTABLISHED AND EACH POTENTIAL SITE WAS EVALUATED AGAINST THE CRITERIA.

SEVEN POTENTIAL OFF-SITE REPOSITORY LOCATIONS WITHIN 12 TO 45 MILES OF THE SITE WERE EVALUATED DURING THE PRELIMINARY SCREENING PROCESS. BASED ON THE SCREENING PROCESS, THE HIGHWAY 95 SITE WAS SELECTED AS THE MOST SUITABLE OF THESE SITES AND WAS KEPT FOR FURTHER STUDY IN THE FS. THIS LOCATION WAS ULTIMATELY ELIMINATED DURING THE DETAILED ANALYSIS OF ALTERNATIVES BECAUSE OF RELATIVELY HIGH COST AND CONCERNS WITH IMPLEMENTABILITY. THE OTHER SIX SITES EXHIBITED SUBSTANTIALLY HIGHER POTENTIALS FOR WIND AND WATER EROSION, FLOODING, AND LANDSLIDES. DESIGN LONGEVITY QUESTIONS, GROUND WATER CONCERNS, AND ENDANGERED SPECIES CONSIDERATIONS ALSO WERE REASONS FOR DROPPING THE OTHER SIX SITES. ALL POTENTIAL OFF-SITE LOCATIONS REQUIRED TRANSPORT OF CONTAMINATED MATERIALS FOR VARIOUS DISTANCES ON PUBLIC ROADS.

2) THE STATE REQUESTED THAT A SITE-SPECIFIC HEALTH AND SAFETY PLAN BE DEVELOPED.

DOE RESPONSE: THIS ACTIVITY IS SCHEDULED TO BE PERFORMED DURING THE

DESIGN PHASE OF THE PROJECT AND WILL BE COMPLETED PRIOR TO PERFORMING FIELD WORK.

3) THE STATE AND EPA MADE NUMEROUS EDITORIAL COMMENTS AND TECHNICALLY ORIENTED SUBSTANTIVE COMMENTS ON THE DRAFT FINAL MRAP RI/FS AND PROPOSED PLAN.

DOE RESPONSE: EDITORIAL AND GRAMMATICAL COMMENTS ON THE RI/FS ARE INCORPORATED IN THE FINAL MRAP RI/FS BY THE ADDITION OF ERRATA SHEETS. NEITHER EDITORIAL NOR GRAMMATICAL COMMENTS ON THE PROPOSED PLAN WERE INCORPORATED SINCE THE PROPOSED PLAN SERVED ITS ONE-TIME PURPOSE DURING THE PUBLIC REVIEW AND COMMENT PERIOD.

SUBSTANTIVE TECHNICAL COMMENTS MADE ON THE RI/FS AND PROPOSED PLAN ARE RESPONDED TO IN THIS RESPONSIVENESS SUMMARY AND IN ADDITION, HAVE BEEN INCORPORATED INTO THE RECORD OF DECISION.

4) THE EPA AND STATE HAD SEVERAL COMMENTS REGARDING APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARS). EPA CLARIFIED THE APPROPRIATENESS OF RCRA AS AN ARAR BY STATING THAT 40 CFR 192, (THE PREDOMINANT RELEVANT AND APPROPRIATE REGULATION FOR THE MONTICELLO MILLSITE CLEANUP) AND PROPOSED AMENDMENTS "... PROVIDE SUFFICIENT PROTECTIVE CONDITIONS TO MAKE THE DETERMINATION THAT ADDITIONAL RCRA SUBTITLE C REGULATIONS ARE NEITHER RELEVANT OR APPROPRIATE...". THE STATE NOTED SEVERAL ADDITIONS TO THE LIST OF ARARS CURRENTLY DEFINED FOR THE PROJECT.

DOE RESPONSE: UNDER CERCLA, ARARS IDENTIFICATION IS TERMED AN ITERATIVE PROCESS. BASED ON THE PROMULGATION AND IDENTIFICATION OF SEVERAL NEW STATE LAWS, AND RESOLUTION OF THE RCRA ISSUE, IT IS APPROPRIATE THAT A

FINAL LIST OF ARARS BE INCLUDED IN THE RECORD OF DECISION. NO ARARS DISCUSSIONS WERE MODIFIED IN THE DRAFT MRAP RI/FS IN RESPONSE TO THESE COMMENTS. HOWEVER, AN ERRATA WAS ADDED THAT REFERS TO THE ARARS TABLE IN THE RECORD OF DECISION, APPENDIX B.

5) THE EPA COMMENTED THAT SEVERAL MRAP FS APPENDICES MAKE REFERENCE TO TWO PRELIMINARY REMEDIAL ACTION ALTERNATIVES, ONE INVOLVING SLURRY WALLS WITHIN THE AQUIFER, AND ONE CONSISTING OF STABILIZATION IN PLACE FOR THE MILL TAILINGS.

DOE RESPONSE: THE FS APPENDICES WERE PREPARED PRIOR TO THE KNOWLEDGE OF PROPOSED CHANGES TO 40 CFR 192, WHICH ADDRESS GROUND WATER QUALITY AT MILL TAILINGS SITES. THE TWO PRELIMINARY ALTERNATIVES DISCUSSED IN THE APPENDICES WERE DROPPED FROM CONSIDERATION AS REMEDIAL ACTION ALTERNATIVES IN THE FS FOR THIS REASON. HOWEVER, THESE APPENDICES STILL CONTAIN RELEVANT INFORMATION FOR THE REMEDIAL ACTION ALTERNATIVES IDENTIFIED IN THE FS AND REMAIN AS ORIGINALLY WRITTEN.

WRITTEN TECHNICAL QUESTIONS/CONCERNS RECEIVED REGARDING REMEDIAL ALTERNATIVES

EPA AND THE STATE HAVE MADE SEVERAL COMMENTS ON THE DESIGN FOR THE PREFERRED ALTERNATIVE (REMOVAL AND DISPOSAL ON-SITE, SOUTH OF THE PRESENT SITE). THESE INCLUDE LOCATION OF THE REPOSITORY AND REPOSITORY DESIGN.

DOE RESPONSE: DOE IS IN AGREEMENT WITH BOTH THE STATE AND EPA THAT THE ENTIRE SOUTH AREA, COMPRISING THE NEAR SOUTH SITE AND FAR SOUTH SITE, SHOULD BE IDENTIFIED AS THE REPOSITORY AREA (SEE FIGURE 9-1). THIS CLARIFICATION HAS BEEN INCORPORATED INTO THE ROD AND WILL ALLOW FLEXIBILITY IN THE DESIGN PROCESS TO SITE THE REPOSITORY IN AN IDEAL POSITION BASED ON FURTHER INVESTIGATION OF THE SITE. AS RECOMMENDED BY EPA, DOE HAS EXPANDED ITS CURRENT GEOTECHNICAL INVESTIGATION TO IDENTIFY THE DESIGN CONSTRAINTS POSED BY TOPOGRAPHY, GEOLOGY, AND GROUND WATER CONDITIONS. THE EXISTING DRILLING INVESTIGATIONS WILL INCLUDE A GROUND WATER STUDY AND ANALYSIS WHICH WILL PROVIDE SUFFICIENT DATA TO IDENTIFY THE PIEZOMETRIC SURFACE BOTH IN THE ALLUVIUM (PEDIMENT GRAVELS) AND IN THE UNDERLYING MANCOS SHALE. BASED ON THESE FINDINGS, A DETERMINATION WILL BE MADE AS TO WHETHER THE NEAR SOUTH SITE IS AN ACCEPTABLE REPOSITORY SITE THAT PROVIDES PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT. IF THE NEAR SOUTH SITE IS DETERMINED TO BE UNACCEPTABLE TO THE STATE AND EPA, THE REPOSITORY WILL BE LOCATED ON THE FAR SOUTH SITE. BOTH THE STATE AND EPA CONSIDER THIS DESIGN APPROACH FOR ON-SITE REMEDIAL ACTION AS APPROPRIATE.

DOE IS IN AGREEMENT WITH EPA AND THE STATE ON THE PRINCIPLE THAT THE REPOSITORY MUST BE DESIGNED AND CONSTRUCTED TO COMPLY WITH 40 CFR PART 192, TITLE I DESIGN CRITERIA. THIS DESIGN MUST BE BASED ON COMPREHENSIVE STUDIES OF THE TAILINGS AND REPOSITORY SITE CHARACTERISTICS. THESE STUDIES ARE EITHER CURRENTLY IN PROGRESS OR ARE

SCHEDULED DURING THE DESIGN PHASE. THE PRIMARY DESIGN GUIDANCE IS THE UMTRA TECHNICAL APPROACH DOCUMENT (TAD) WHICH INCLUDES THE LATEST ACCEPTABLE REPOSITORY DESIGN APPROACH. THE PRELIMINARY DESIGN PRESENTED IN THE FS IS BASED ON THE TAD, OTHER UMTRA RESEARCH, AND DOE/NRC RESEARCH FOR LONG-TERM REPOSITORIES WITH UP TO A 1,000-YEAR LIFE. A MUTUALLY ACCEPTABLE DESIGN WILL BE AGREED TO, ONCE THE DESIGN REVIEW PROCESS IS INITIATED. IT IS ALSO RECOGNIZED THAT NEW INFORMATION WILL BE FORTHCOMING IN REVISED TADS THAT WILL ALSO CHANGE THE DESIGN CONCEPT OF THE REPOSITORY. THE FINAL REPOSITORY DESIGN WILL BE BASED ON THE LATEST RESEARCH AND EXPERIENCE AVAILABLE, AND WILL BE APPROVED BY THE STATE AND EPA.2) EPA AND THE STATE MADE SEVERAL COMMENTS REGARDING THE SELECTION AND EFFECTIVENESS OF PASSIVE RESTORATION OF THE GROUND WATER.

DOE RESPONSE: DOE AGREES WITH EPA AND THE STATE THAT THE PROPOSED PLAN PROVIDES FOR THE GROUND WATER CONTAMINATION TO BE CLEANED UP IN ACCORDANCE WITH 40 CFR PART 192. SOME ACTIVE GROUND WATER TREATMENT MEASURES WOULD INITIALLY BE EMPLOYED DURING THE TAILINGS (SOURCE) REMOVAL ACTIVITIES TO DE-WATER TAILINGS. ACTIVITIES TO BE IMPLEMENTED PRIOR TO MILL TAILINGS REMEDIATION INVOLVE IMPLEMENTING INSTITUTIONAL CONTROLS (CONSISTING OF BUYING OR LEASING WATER RIGHTS, FOR EXAMPLE) TO

RESTRICT ANY POTENTIAL PUBLIC USE OF THE GROUND WATER AND IMPLEMENTATION OF A MONITORING PROGRAM TO EVALUATE CHANGES IN GROUND WATER CONTAMINATION AS A RESULT OF TAILINGS REMOVAL.

THROUGHOUT CONSTRUCTION OF OPERABLE UNITS I/II, A GROUND WATER MONITORING PROGRAM OF THE ALLUVIAL AND BURRO CANYON AQUIFERS WILL BE CONDUCTED. THIS MONITORING PROGRAM WILL CONTINUE FOR THREE YEARS AFTER REMOVAL OF THE CONTAMINATED MATERIAL. AS MONITORING CONTINUES DURING THE THREE YEAR PERIOD, DOE, EPA, AND THE STATE WILL PERIODICALLY REVIEW THE RESULTS OF THE MONITORING DATA AND DETERMINE WHAT ADDITIONAL STEPS, IF ANY, WILL BE REQUIRED TO COMPLETE AQUIFER RESTORATION. WHEN SUFFICIENT DATA HAS BEEN GATHERED TO WARRANT A FINAL DECISION FOR GROUND WATER RESTORATION, A RECORD OF DECISION WILL BE PRODUCED FOR OPERABLE UNIT III.

3) VARIOUS COMMENTS WERE RECEIVED FROM EPA, THE STATE OF UTAH, TWO NEARBY NRC-LICENSED MILLSITES, AND CONSTRUCTION AND CONSULTING FIRMS PERTAINING TO THE COST COMPARISONS AND DESIGN REQUIREMENTS FOR THE VARIOUS ALTERNATIVES.

DOE RESPONSE: THE COST ESTIMATES AND DESIGN REQUIREMENTS PRESENTED IN THE RI/FS WERE DEVELOPED UTILIZING CONSISTENT CRITERIA FOR REGULATORY CONSIDERATIONS, TECHNICAL DESIGN, DOE SUBCONTRACTING, AND PROCUREMENT PRACTICES. SOME OF THE SPECIFIC QUESTIONS RAISED INCLUDE:

3A) WHY THE COST SAVINGS ASSOCIATED WITH PLACING THE TAILINGS INTO EXISTING NRC-LICENSED DISPOSAL SITES WAS NOT UTILIZED FOR THE OFF-SITE DISPOSAL ALTERNATIVE.

THERE ARE SEVERAL SIGNIFICANT PROBLEMS WITH DISPOSING OF THESE CERCLA

MATERIALS IN AN NRC-LICENSED MILLSITE.

* STATE OF UTAH POLICY PROHIBITS THE DISPOSAL OF CERCLA MATERIAL AT AN NRC-LICENSED MILLSITE.

* THE MRAP REPOSITORY DESIGN MUST COMPLY WITH UMTRCA TITLE I REQUIREMENTS FOR INACTIVE MILLSITES. TITLE II REQUIREMENTS FOR LICENSED MILLSITES DO NOT NECESSARILY FULFILL ALL TITLE I REQUIREMENTS FOR THE 200- TO 1,000- YEAR REPOSITORY DESIGN LIFE.

* DOE WOULD BE UNWILLING, GIVEN THE PERPETUAL LEGAL LIABILITIES FOR CERCLA MATERIALS, TO CO-DISPOSE THE MONTICELLO TAILINGS WITH ANY OTHER MILLSITE MATERIALS THAT MAY HAVE PRE-EXISTING SITE RELEASES OR DESIGN INADEQUACIES. THE ONLY FEASIBLE OFF-SITE ALTERNATIVE FROM A LIABILITY STANDPOINT WOULD BE TO CONSTRUCT A SEPARATE REPOSITORY CELL COMPLYING WITH TITLE I REQUIREMENTS FOR THE CERCLA MATERIALS.

3B) DOE WAS ASKED WHY THE COST ESTIMATES SEEMED TO BE MUCH HIGHER THAN COMMERCIAL PRACTICE FOR URANIUM MILLSITE REMEDIATION.

THESE ESTIMATES ARE BASED UPON R.S. MEANS DATA, INCORPORATING THE REQUIREMENTS FOR CERCLA AND DOE QUALITY ASSURANCE AND ENVIRONMENTAL, HEALTH, AND SAFETY STANDARDS. IN ADDITION, DOE REQUIRES ALL SUBCONTRACTED ACTIVITIES TO COMPLY WITH DAVIS-BACON WAGE RATES. SPECIFIC QUESTIONS AND RESPONSES ARE DETAILED BELOW.

3C) ACCORDING TO THE SUPERFUND GUIDANCE AS STATED ON PAGE 4-8 OF THE FEASIBILITY STUDY, INFLATION MUST BE TAKEN INTO ACCOUNT BEFORE PRESENT WORTH ANALYSIS CAN BE PERFORMED. IN THE COST ESTIMATES, THE COSTS ARE EXPRESSED IN 1989 DOLLARS AND ARE ALLOCATED TO THE YEAR IN WHICH THEY OCCUR WITHOUT TAKING INTO ACCOUNT INFLATION. IT APPEARS THAT THE COSTS ARE THEN DISCOUNTED. IF INFLATION HAS NOT BEEN INCORPORATED IN THE ANALYSIS, PLEASE MAKE THE APPROPRIATE CHANGES TO INCLUDE INFLATION OR JUSTIFY WHY INFLATION WAS NEGLECTED.

ACCORDING TO THE MARCH 1988 SUPERFUND GUIDANCE, A DISCOUNT RATE OF 5 PERCENT BEFORE TAXES AND AFTER INFLATION SHOULD BE ASSUMED. THIS DISCOUNT RATE TAKES INTO ACCOUNT INFLATION. IF ALL COSTS WERE INFLATED, A HIGHER DISCOUNT RATE WOULD HAVE BEEN USED. REGARDLESS OF WHICH APPROACH IS USED, THE NET RESULT OF THE RANKING OF ALTERNATIVES BY COST WOULD NOT CHANGE.

3D) IN THE COST ESTIMATES, SOME YEARS APPEAR TO HAVE TWO OPERATING COSTS. FOR EXAMPLE ON PAGE F-23 OF THE FS REPORT, THE YEAR 1996 HAS A COST OF $250,000 AND $42,000. PLEASE EXPLAIN THIS APPARENT INCONSISTENCY.

ENVIRONMENTAL MONITORING AT AN OPERATING COST OF $250,000 PER YEAR BEGINS IN 1990 AND IS COMPLETED BY THE END OF 1995 (BEGINNING OF 1996). GROUND WATER MONITORING AT AN OPERATING COST OF $42,000 PER YEAR BEGINS IN 1996 AND IS COMPLETED BY THE END OF 2019 (START OF 2020). THE YEAR 1996 HAS ONLY ONE OPERATING COST OF $42,000.

3E) SOME OF THE PRESENT WORTH CALCULATIONS CANNOT BE REPRODUCED. FOR EXAMPLE, THE OPERATING AND MAINTENANCE COSTS ON PAGE F-23 OF THE FS REPORT. PLEASE MAKE ANY NECESSARY CORRECTIONS.

THE PRESENT WORTH CALCULATIONS HAVE BEEN RECALCULATED. WHILE THE CAPITAL COSTS ARE THE SAME, THERE ARE SOME MINOR CHANGES IN THE OPERATING AND MAINTENANCE COSTS. NONE OF THE CHANGES IN COST CHANGE THE OVERALL RANKING OF ALTERNATIVES. TABLE A3-1 SHOWS CORRECT CALCULATIONS OF PRESENT WORTH.

3F) PLEASE EXPLAIN WHY THE SPECIFIED PERCENTAGES WERE CHOSEN FOR THE INDIRECT COSTS AND THE CONTINGENCIES.

THE PERCENTAGES FOR INDIRECT COSTS ARE BASED ON CURRENTLY UTILIZED COST

DATA FOR OTHER CONSTRUCTION PROJECTS ADMINISTERED FOR THE DEPARTMENT OF ENERGY. THE PERCENTAGE FOR CONTINGENCIES IS TYPICAL FOR ALTERNATIVES IN A PRELIMINARY OR CONCEPTUAL PHASE.

3G) PLEASE EXPLAIN WHY LABOR, MATERIALS, EQUIPMENT, AND POTENTIAL SUBCONTRACTING ITEMS SHOULD ALL BE ALLOCATED THE SAME OVERHEAD PERCENTAGE.

R.S. MEANS, WHICH IS A PRIMARY DATA SOURCE OF CONSTRUCTION COSTS, BREAKS COSTS INTO LABOR, EQUIPMENT, AND MATERIAL. THE UNIT COSTS SHOWN IN THE COST ESTIMATES CONSIST OF THE TOTAL OF LABOR, EQUIPMENT, AND MATERIAL WITH OVERHEAD PERCENTAGES DETERMINED BY R.S. MEANS DATA. FOR OUR PURPOSES, THE COST ESTIMATES ARE TO BE IN THE +50 TO -30 PERCENT RANGE. UNIT COSTS ARE THE LEVEL OF DETAIL REQUIRED.

3H) THE COSTS FOR HAULING TAILINGS TO AN ALTERNATE SITE WOULD MOST LIKELY BE A SUBCONTRACT, AND IT IS NOT APPARENT WHY THEY SHOULD BE SUBJECT TO THE SAME INDIRECT AND OVERHEAD COSTS. SIMILARLY, THE COSTS FOR HAULING CLEAN MATERIAL FOR THE RESTORATION OF MONTEZUMA CREEK FLOODPLAIN DO NOT RECOGNIZE THE OBVIOUS ECONOMIES OF SCALE RESULTING FROM THE TRUCKS RETURNING EMPTY FROM THE RECEIVING REPOSITORY.

FOR THE LEVEL OF EFFORT REQUIRED, ALL CONSTRUCTION COSTS WERE BURDENED BY THE SAME INDIRECT AND OVERHEAD COSTS. THERE IS NO NEED TO BREAK THE CONSTRUCTION COSTS OUT BY SUBCONTRACTS. THE INDIRECT AND OVERHEAD COSTS WOULD CHANGE BY AN INSIGNIFICANT AMOUNT. THERE MAY BE SOME SAVINGS BY HAULING CLEAN BACKFILL BACK TO MONTEZUMA CREEK, BUT BECAUSE OF ALL THE UNKNOWNS (E.G., TRUCK DECONTAMINATION NEEDS, SUITABILITY AND LOCATION OF FILL MATERIAL, ETC.) THE CONSERVATIVE APPROACH WAS TAKEN.

4) SEVERAL COMMENTS WERE RECEIVED REGARDING THE METHODS AND TIME REQUIRED FOR ACTIVE GROUND WATER TREATMENT AND WHETHER DOWNSTREAM IMPACTS HAD BEEN FULLY CONSIDERED.

DOE RESPONSE: THROUGHOUT CONSTRUCTION OF OPERABLE UNITS I/II, A GROUND WATER MONITORING PROGRAM OF THE ALLUVIAL AND BURRO CANYON AQUIFERS AND MONTEZUMA CREEK WILL BE CONDUCTED. THIS MONITORING PROGRAM WILL CONTINUE FOR THREE YEARS AFTER REMOVAL OF THE CONTAMINATED MATERIAL. AS MONITORING CONTINUES DURING THE THREE YEAR PERIOD, DOE, EPA, AND THE STATE OF UTAH WILL PERIODICALLY REVIEW THE RESULTS OF THE MONITORING DATA AND DETERMINE WHAT ADDITIONAL STEPS, IF ANY, WILL BE REQUIRED TO COMPLETE AQUIFER- AND SURFACE-WATER RESTORATION. WHEN SUFFICIENT DATA HAS BEEN GATHERED TO WARRANT A FINAL DECISION FOR RESTORATION, A RECORD OF DECISION WILL BE PREPARED FOR OPERABLE UNIT III.

INSTITUTIONAL CONTROLS MAY BE IMPLEMENTED PRIOR TO REMEDIATION OF OPERABLE UNITS I AND II. THESE CONTROLS WILL BE MAINTAINED UNTIL THE AQUIFER IS IN COMPLIANCE WITH THE PREVAILING STANDARDS.

ALTHOUGH THERE ARE TRACES OF CONTAMINATION FOUND DOWNSTREAM IN THE

MONTEZUMA CANYON AREA OF MONTEZUMA CREEK, CONSTITUENTS DO NOT EXCEED WATER-QUALITY STANDARDS TO THE NEAREST WATER USER DOWNSTREAM OF THE CANYON.

REMAINING CONCERNS

ALL WRITTEN AND ORAL PUBLIC CONCERNS WERE ADDRESSED AT THE PUBLIC MEETINGS AND/OR WITHIN THIS RESPONSIVENESS SUMMARY. WRITTEN COMMENTS RECEIVED FROM THE EPA AND THE STATE DURING THE PUBLIC COMMENT PERIOD HAVE BEEN ADDRESSED IN THIS RESPONSIVENESS SUMMARY AND INCORPORATED INTO THE RECORD OF DECISION, OR ADDED AS ERRATA TO THE FINAL MRAP RI/FS. THERE ARE NO REMAINING CONCERNS LEFT UNADDRESSED.

#TA

ATTACHMENT TO APPENDIX A
COMMUNITY RELATIONS ACTIVITIES FOR THE MONTICELLO MILL TAILINGS SUPERFUND; JANUARY 1990

COMMUNITY RELATIONS ACTIVITIES CONDUCTED ON BEHALF OF THE MONTICELLO MILL TAILINGS SUPERFUND SITE TO DATE HAVE INCLUDED THE FOLLOWING:

* SITE VISITS AND MEETINGS BETWEEN THE DOE, THE REMEDIAL ACTION CONTRACTOR (RAC), THE MONTICELLO CITY MANAGER, SAN JUAN COUNTY COMMISSIONERS, STATE OF UTAH REPRESENTATIVES, AND INDIVIDUAL PROPERTY OWNERS. (1980)

* NEWS RELEASES ON THE BEGINNING OF THE VICINITY PROPERTY CLEANUP PROGRAM AND THE RESULTS OF GENERALIZED RADIOLOGIC

ASSESSMENTS AND SURVEY ACTIVITIES. (1980)

* GENERAL INFORMATION BRIEFINGS BY DOE TO THE LOCAL NEWS MEDIA, UTAH STATE BUREAU OF RADIATION AND OCCUPATIONAL HEALTH, AND THE SE UTAH DISTRICT HEALTH DEPARTMENT.

* ISSUED A FACT SHEET ON THE MONTICELLO URANIUM MILL TAILINGS. (1982)

* MAINTAINED CLOSE CONTACT WITH THE STATE OF UTAH GOVERNOR, STATE DIVISION OF ENVIRONMENTAL HEALTH, AND STATE DEPARTMENT OF NATURAL RESOURCES AND ENERGY. (1982)

* PARTICIPATED IN SAN JUAN COUNTY BOARD OF COMMISSIONERS MEETING TO PROVIDE AN UPDATE ON THE DOE'S SURPLUS FACILITIES MANAGEMENT PROGRAM (SFMP) PLAN FOR MONTICELLO CLEAN UP. (1982)

* MAINTAINED ONGOING COMMUNICATIONS WITH CITY AND COUNTY OFFICIALS. (1983)

* MET WITH STATE OFFICIALS AND THE SAN JUAN COUNTY BOARD OF COMMISSIONERS TO DISCUSS CONTINUATION OF THE MONTICELLO MILLSITE (MRAP) AND VICINITY PROPERTIES (MVP) PROGRAMS AND TO OUTLINE PROGRAM MILESTONES. (1984)

* WORKED WITH THE SAN JUAN RECORD ON A MAJOR ARTICLE SUMMARIZING CLEAN-UP ACTIVITIES DURING 1985, INCLUDING THE SUPERFUND CLEAN-UP PROGRAM. (1986)

* CONDUCTED COMMUNITY INTERVIEWS WITH LOCAL OFFICIALS AND AFFECTED RESIDENTS. (1986)

* PREPARED A DRAFT COMMUNITY RELATIONS PLAN. (MAY 1987)

* MAINTAINED ONGOING DISCUSSIONS BETWEEN EPA, DOE, THE STATE, SAN JUAN COUNTY, AND THE CITY OF MONTICELLO DURING THE NEGOTIATION OF THE FEDERAL FACILITIES AGREEMENT. (1988)

* ISSUED A PRESS RELEASE ANNOUNCING A PUBLIC MEETING TO DISCUSS THE FEDERAL FACILITIES AGREEMENT (FFA). A PUBLIC COMMENT PERIOD FROM FEBRUARY 9 THROUGH FEBRUARY 20, 1989 WAS PROVIDED. (JANUARY 27, 1989)

* CONDUCTED A HEALTH AND SAFETY TRAINING WORKSHOP FOR THOSE INVOLVED IN THE MONTICELLO VICINITY PROPERTIES CLEAN UP. INCLUDED IN THE TRAINING WERE REPRESENTATIVES FROM THE STATE OF UTAH AND THE CITY OF MONTICELLO. (MARCH 1989)

* ESTABLISHED AN INFORMATION REPOSITORY AND THE ADMINISTRATIVE RECORD AT THE SAN JUAN COUNTY LIBRARY. (JUNE 28, 1989)

* CONDUCTED SPECIAL BRIEFINGS FOR THE MONTICELLO CITY COUNCIL AND THE SAN JUAN COUNTY COMMISSIONERS ON THE DOE 5-YEAR ENVIRONMENTAL RESTORATION AND WASTE MANAGEMENT PLAN. (OCTOBER & NOVEMBER 1989)

* PROVIDED PUBLIC REVIEW COPIES OF THE RI/FS AND PROPOSED PLAN FOR THE MONTICELLO MILLSITE TO THE ADMINISTRATIVE RECORD AND INFORMATION REPOSITORY LOCATIONS. (OCTOBER 27, 1989)

* DEVELOPED AND DISTRIBUTED A 5-PAGE INFORMATION UPDATE ON THE MRAP SUPERFUND SITE. (NOVEMBER 1989)

* PUBLISHED TWO NOTICES OF OPPORTUNITY TO COMMENT IN THE LOCAL NEWSPAPER. A PUBLIC COMMENT PERIOD FROM OCTOBER 27 THROUGH NOVEMBER 25, 1989 WAS PROVIDED. (OCTOBER 25 AND

NOVEMBER 15, 1989)

* CONDUCTED A PUBLIC MEETING IN MONTICELLO ON NOVEMBER 16, 1989 TO DESCRIBE THE WORK PLAN CONTENTS AND TO RESPOND TO QUESTIONS. TWENTY-EIGHT PEOPLE ATTENDED, INCLUDING THE MONTICELLO MAYOR, CITY MANAGER, REPRESENTATIVES FROM THE CITY COUNCIL, A REPRESENTATIVE FOR US SENATOR JAKE GARN AND US REPRESENTATIVE HOWARD NIELSON, THE SAN JUAN COUNTY DISTRICT SANITARIAN, REPRESENTATIVES FROM THE STATE OF UTAH DEPARTMENT OF HEALTH, AND MEMBERS OF THE PUBLIC. A TRANSCRIPT OF THE MEETING, INCLUDING ALL QUESTIONS AND ANSWERS, IS AVAILABLE AS PART OF THE ADMINISTRATIVE RECORD AT THE SAN JUAN COUNTY LIBRARY. (NOVEMBER 1989)

* ISSUED A PRESS RELEASE ON THE ADDITION OF THE MONTICELLO SITE TO THE SUPERFUND NATIONAL PRIORITY LIST (NPL). (NOVEMBER 1989)

APPENDIX B
FEDERAL AND STATE OF UTAH APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

THE FOLLOWING APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS FOR OPERABLE UNITS I AND II HAVE BEEN IDENTIFIED. APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS FOR THE REMEDIATION OF OPERABLE UNIT III WILL BE DEFINED DURING DEVELOPMENT OF THE GROUND WATER AND SURFACE-WATER RECORD OF DECISION.

THE REGULATIONS AFFECTING RADIOACTIVE MATERIALS AS PROMULGATED IN 40 CFR

PART 192 AND AS PROPOSED IN THE "STANDARDS FOR REMEDIAL ACTIONS AT INACTIVE URANIUM PROCESSING SITES WITH GROUND WATER CONTAMINATION" (52 FR 36000, SEPTEMBER 24, 1987), ARE APPROPRIATE TO THE SPECIFIC CHARACTERISTICS OF RADIOACTIVE MATERIALS THAT EXIST AT THE SITE. REVIEW AND ANALYSIS OF THE MAJOR PROVISIONS WITHIN 40 CFR PART 192 INDICATE THAT THEY ARE FUNCTIONALLY EQUIVALENT TO AND ARE MORE PROTECTIVE THAN POTENTIALLY "RELEVANT AND APPROPRIATE" NONRADIOACTIVE HAZARDOUS WASTE REQUIREMENTS OF THE RESOURCE CONSERVATION AND RECOVERY ACT, SUBTITLE C. THE TECHNOLOGICAL STANDARDS PRESENTLY INCORPORATED INTO 40 CFR PART 192 AND THE PROPOSED RULE, "STANDARDS FOR REMEDIAL ACTIONS AT INACTIVE URANIUM PROCESSING SITES WITH GROUND WATER CONTAMINATION" PROVIDE SUFFICIENT PROTECTIVE CONDITIONS TO MAKE THE DETERMINATION THAT ADDITIONAL RESOURCE CONSERVATION AND RECOVERY ACT, SUBTITLE C, REGULATIONS ARE NEITHER "RELEVANT OR APPROPRIATE," PROVIDED THAT THE DEPARTMENT OF ENERGY CONTINUES TO INCORPORATE THE PROVISIONS OF THE PROPOSED RULE IN THE REMEDIAL ACTION OF THE MONTICELLO MILLSITE.

IF HAZARDOUS WASTES ARE ENCOUNTERED ON SITE, THEY SHALL BE REMEDIATED AND DISPOSED OF IN ACCORDANCE WITH THE RESOURCE CONSERVATION AND RECOVERY ACT AND ANY OTHER APPLICABLE REGULATIONS.

MONTICELLO MILL TAILINGS (USDOE)

Site Information:

Site Name: MONTICELLO MILL TAILINGS (USDOE)
Address: MONTICELLO, UT

EPA ID: UT3890090035
EPA Region: 08

Record of Decision (ROD):

ROD Date: 09/29/1998
Operable Unit: 03
ROD ID: EPA/541/R-98/106

Media: Groundwater, Surface Water

Contaminant: Inorganics, Metals, Radioactive

Abstract: Please note that the text in this document summarizes the Record of Decision for the purposes of facilitating searching and retrieving key text on the ROD. It is not the officially approved abstract drafted by the EPA Regional offices. Once EPA Headquarters receives the official abstract, this text will be replaced.

The Monticello Mill Tailings site is located in southeast Utah, in and near the city of Monticello. The Millsite is a 110-acre tract of land owned by the U.S. Department of Energy (DOE). Mill tailings and associated contaminated material remain on the Millsite as a result of historical vanadium and uranium milling operations. Land use surrounding the site is residential, recreational and agricultural, with continued recreational use expected around the site in the future. Surface water in the vicinity of the site is used to water livestock. Groundwater has been classified as Class II Drinking Water Quality Groundwater. The City of Monticello occasionally withdraws groundwater from the Burro Canyon aquifer for non-potable use. Groundwater in the alluvial aquifer above the Burro Canyon aquifer has been contaminated. Surface water is contaminated throughout Montezuma Creek.

The U.S. DOE began operations at the site in the mid-1940s and continued until 1960. The Millsite was used to produce materials used in the production of steel and construction of nuclear weapons.

Processing of uranium and vanadium ores resulted in the generation of mill tailings, which were disposed on the site in four tailings piles. The piles, which are within the floodplain of Montezuma Creek, were covered with soil and seeded with native grasses in the early 1960s to prevent erosion. The tailings piles have provided a continuing source of groundwater contamination, and some of the piles are in hydraulic contact with the shallow alluvial aquifer underlying the site.

In December 1988, DOE, the Environmental Protection Agency (EPA) and the State entered into a Federal Facilities Agreement. EPA included the site on the National Priorities List in November 1989.

Operable Unit 1 (OU1):
OU1 addresses mill tailings and other contaminated materials from the Millsite. EPA signed a Record of Decision (ROD) in September 1990, addressing both OU1 and OU2 through excavation of tailings and contaminated material and containment in an onsite permanent repository.

OU2:
OU2 addresses the remediation of peripheral properties that are contaminated by radioactive material from the Millsite. EPA signed a ROD in September 1990, addressing both OU1 and OU2 through excavation of contaminated material and containment in a permanent onsite repository.

OU3:
OU3 addresses groundwater and surface water at and downgradient of the Monticello Millsite as well as contaminated soil and sediment deposited downstream and adjacent to Montezuma Creek. The onsite tailings piles are the primary source of contamination in groundwater, surface water, soil and sediment within OU3. Environmental investigations of the site have been conducted at and near OU3 since the early 1950s. These investigations focused primarily on surface water quality in Montezuma Creek. Investigations conducted between 1979 and 1992 were more comprehensive than earlier studies and included routine surface and groundwater monitoring.

A draft OU3 remedial investigation and feasibility study has been completed. OU3 soil and sediment cleanup are being conducted as a non-time critical removal action that will be completed in the summer of 1999. The removal action involves excavation of contamination from discrete areas and implementation of

institutional controls. An interim ROD was completed in 1998 addressing surface water and groundwater.

Remedy: The selected interim remedial action for Monticello Mill Tailings site (MMTS) operable unit 3 (OU3) includes institutional controls, Millsite dewatering and treatment, monitoring, and permeable reactive treatment (PeRT) wall installation. Institutional controls will restrict the use of contaminated groundwater while groundwater remediation is in progress. Access to water rights will be prohibited and a moratorium will be placed on drilling new water wells in the contaminated alluvial aquifer. These controls will be administered through the State Engineer. Monitoring will continue on a semiannual basis and be reviewed as data becomes available to assess the effectiveness of the interim remedial action. Monitoring will involve sampling up to 24 monitoring wells and 8 surface water locations and analyzing all metal and radionuclide contaminants of concern (COCs) for OU3. Ongoing Millsite dewatering and treatment will continue during the remediation of OU1 and if determined necessary, will continue after excavation of source material from the Millsite is complete. Water is currently undergoing chemical treatment followed by microfiltration and/or reverse osmosis. Secondary water generated is disposed in the on-site repository. Clean water is discharged to Montezuma Creek in accordance with Utah Pollutant Discharge Elimination System (UPDES) requirements. Installation of the pilot-scale PeRT wall will determine the effectiveness of the technology in removing contaminants from the groundwater at the MMTS.

The PeRT wall is an innovative technology, so there are uncertainties associated with its performance. However treatability studies have proven promising to date, and the technology has been used successfully at sites similar in nature to OU3. Performance of PeRT wall will be monitored on a regular basis, and if problems arise, steps can be taken to correct them. Additionally, a five-year review of the monitoring data will be conducted to assess the performance of the interim remedial action and assist in the development of the final remedial action for OU3.

Estimated Present Worth (5-year period) Costs: $4,010,400
Estimated Capital Costs: $2,313,000
Estimated Annual O&M Costs $414,000

Text: Full-text ROD document follows on next page.

EPA 541-R98-106

<IMG SRC 981060>

<IMG SRC 98106A>

RECORD OF DECISION
FOR AN INTERIM REMEDIAL ACTION AT
THE MONTICELLO MILL TAILINGS SITE,
OPERABLE UNIT III - SURFACE WATER AND GROUND WATER,
MONTICELLO, UTAH

This is a primary document for Operable Unit III at Monticello, Utah. It will be available in the Administrative Record, which is maintained at the following locations:

- Monticello City Offices
  17 North 1st Street East
  Monticello, UT 84535

  Hours: 8 a.m.-4:30 p.m.

- DOE Grand Junction Office
  2597 B 3/4 Road
  Grand Junction, CO 81503

  Hours: 8 a.m.-4:30 p.m.

Record of Decision for an Interim Remedial Action
at The Monticello Mill Tailings Site,
Operable Unit III-Surface Water and Ground Water,
Monticello, Utah

August 1998

Prepared by
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Acronyms

ARAR applicable or relevant and appropriate requirements
CERCLA Comprehensive Environmental Response, Compensation, and Liability Act
CT central tendency

DOE	U.S. Department of Energy
EPA	U.S. Environmental Protection Agency
FFA	Federal Facilities Agreement
ft	feet
MMTS	Monticello Mill Tailings Site
NCP	National Contingency Plan
O&M	operation and maintenance
OU	operable unit
PeRT	permeable reactive treatment
RCRA	Resource Conservation and Recovery Act
RME	reasonable maximum exposure
State	State of Utah
UMTRCA	Uranium Mill Tailings Radiation Control Act
UPDES	Utah Pollutant Discharge Elimination Systems
yd 3	cubic yards

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Glossary

Administrative Record: All documents which were considered or relied on in selecting the response action at a Superfund site, culminating in the record of decision for remedial action or,
an action memorandum for removal actions.

Alluvial aquifer: An aquifer composed of unconsolidated materials (sand, gravel, cobbles, silt) deposited by stream flow. Usually is the uppermost aquifer of a ground-water system and is affected by processes at the land surface (e.g., precipitation, streamflow).

Aquifer: A geologic formation, group of formations, or part of a formation capable of yielding a significant amount of ground water to wells or springs.

Aquitard: Geological formation that may contain ground water but is not capable of transmitting significant quantities of it under normal hydraulic gradients. May function as a confining bed.

Applicable or Relevant and Appropriate Requirements (ARARs): Any state or federal statute that pertains to protection of human life and the environment in addressing specific conditions or
use of a particular cleanup technology at a Superfund site.

Baseline Risk Assessment: Baseline risk assessments provide an evaluation of the potential threat to human health and the environment in the absence of any remedial action. They provide the basis for determining whether or not remedial action is necessary and the justification for performing remedial actions. Baseline Risk Assessments can be performed to evaluate both

human health risks and ecological risks.

Burro Canyon Formation: A unit of rock composed of sandstone and conglomerate that is present in the subsurface and surface at various locations in the Four Corners region of the U.S.
The Burro Canyon Formation is Cretaceous in age. Locally, the Burro Canyon Formation may be used as a source of drinking water.

Conceptual Model: A preliminary "model" of a Site developed using readily available information. Used to identify all potential or suspected sources of contamination, types and concentrations of contaminants detected at the site, potentially contaminated media, and potential
exposure pathways, including receptors.

Feasibility Study: A study undertaken by the lead agency to develop and evaluate options for remedial action. The feasibility study emphasizes data analysis, implementability of alternative,
and cost analyses, as well as compliance with mandates to protect human health and the environment and attain regulatory standards of other laws. The feasibility study is generally performed concurrently and in an interactive fashion with the remedial investigation, using data gathered during the remedial investigation.

Glossary (continued)

Focused Remedial Investigation: A streamlined process undertaken by the lead agency to determine the nature and extent of the problem presented by a release. A focused remedial investigation emphasizes use of existing data and very limited and specific additional data collection. The remedial investigation includes gathering of specific information to determine the
necessity for remedial action and to support the evaluation of remedial alternatives.

Ground Water: Water in the ground that is wholly saturated.

Hazard Ranking System: Formal system employed by the U.S. Environmental Protection Agency (EPA) to rank the hazards of a site on the basis of preliminary investigation and assessment. Ranking scores determine site eligibility for the National Priorities List.

High water content: Containing a large percentage of water per volume of material.

Interim Remedial Action: A remedial action that initiates remediation of a site but may not constitute the final remedy.

Lithic scatter: Scattering of rock material that has been altered by historic or ancient humans for
tools or weapons.

National Priorities List: EPA's list of the most serious uncontrolled or abandoned hazardous waste sites identified for possible long-term remedial action under Superfund.

Non-time critical Removal Action: A removal action under CERCLA is a short-term

immediate action taken to address releases of hazardous substances that require expedited response (removals generally mitigate or stabilize individual threats rather than all threats at a
CERCLA site). Non-time critical removal actions require more than 6-months planning prior to field implementation.

Permeable Reactive Treatment (PeRT) Wall: This is a permeable wall that is placed across an aquifer perpendicular to ground-water flow; it contains reactive media that removes or degrades contaminants as the ground water passes through.

Potable: Suitable for drinking.

Potentiometric surface: An imaginary surface representing the level to which ground water would rise in a well.

Radionuclides: Naturally occurring or artificially produced radioactive element or isotope. Radioactive materials spontaneously emit ionizing radiation.

Recharge zone: An area (land surface) in which water infiltrates and reaches the zone of saturation in one or more aquifers.

Glossary (continued)

Receptors: Living organisms that could be exposed to chemicals and/or conditions that can cause adverse effects on those organisms.

Regulatory standards: Concentrations of chemicals that are minimum requirements for quality of a given medium (e.g., ground water, air) for a particular purpose (e.g., drinking water, irrigation). If standards are met, the medium is considered safe to use (i.e., no adverse effects will
occur) for that purpose.

Removal Action: A removal action under CERCLA is a short-term immediate action taken to address releases of hazardous substances that require expedited response (removals generally mitigate or stabilize individual threats rather than all threats at a CERCLA site).

Responsiveness Summary: A summary of oral and/or written public comments received by the lead agency on key cleanup-related documents and the agency's response to those comments.

Saturated thickness: The thickness of an aquifer in which all the interconnected spaces are completely filled with water.

Secular equilibrium: The condition whereby sufficient time has elapsed such that the rates of decay and creation are equal for each radioisotope in a radioactive decay series.

Slurry: A highly fluid mixtuire of water and a very fine-grained solid material.

Stakeholder: Any organization, governmental entity or individual that has a stake in or may be impacted by a given approach to environmental regulation, pollution prevention, energy conservation, etc.

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DECLARATION FOR THE
INTERIM REMEDIAL ACTION
RECORD OF DECISION

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Document Number Q011601 Declaration

Site Name and Location

Operable Unit III - Surface Water and Ground Water
Monticello Mill Tailings Site
Monticello, Utah

Statement of Basis and Purpose

This decision document presents the selected interim remedial action for Operable Unit (OU) III surface water and ground water at the Monticello Mill Tailings Site (MMTS) in San Juan County, Utah. The selected interim remedial action was chosen in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act as amended by the Superfund Amendments and Reauthorization Act of 1986 and, to the extent practicable, with the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). This decision is based on the administrative record for this site. The State of Utah concurs with the selected interim action.

The selected alternative for the interim remedial action for OU III surface water and ground water
at the MMTS is Alternative 2-implementing institutional controls, continuing Millsite dewatering and treatment of excavation water and surface runoff, continuation of ongoing monitoring efforts, and evaluation of a permeable reactive treatment (PeRT) wall through the use of a pilot-scale treatability study. The PeRT wall is an enhancement to the interim remedial action. This remedial action is only an interim measure. If monitoring results indicate that the interim remedial action is not achieving the objectives of-preventing exposure to and reducing contaminants in contaminated ground water, other alternatives will be evaluated from the OU III feasibility study. The final remedy for the site surface water and ground water will be documented in the final Record of Decision (ROD) for OU III.

Assessment of the Site

Current risks to human health associated with the contaminants in OU III surface water and ground water are below levels considered by the U.S. Environmental Protection Agency to be significant. However, this interim remedial action is warranted based on possible future risks to human health and the environment, to limit exposure to contaminants while further information is gathered to characterize the site, to determine the effectiveness of a PeRT wall in removing contaminants, and to evaluate final remedial actions.

Description of the Selected Remedy

OU III is one of three OUs at the MMTS; a remedial investigation and feasibility study have been completed for OU III. A ROD was signed for OUs I (the Millsite) and II (Peripheral Properties adjacent to the Millsite) which stipulated that contaminated materials from OUs I and II would be excavated and placed in an on-site repository. Mill tailings piles and contaminated soils and sediments associated with OUs I and II of the MMTS are the primary sources of OU III surface water and ground-water contamination. These contaminant sources are being excavated and disposed of in the repository just south of the Millsite. Excavation in some areas requires dewatering operations, involving extraction and treatment of ground water; some on-site surface

water is also collected and treated during excavation. Thus, source control activities are achieving some mass reduction of contaminants in the aquifer system and, in turn, the surface water. As documented in an Action Memorandum (DOE 1998a), DOE recently initiated a removal action (OU III soils and sediments) to excavate contaminated soils and sediments within the Montezuma Creek floodplain downgradient of the Millsite. Results of the risk assessment indicate that current ground-water contaminant levels may cause unacceptable future risks.

Because Millsite conditions are changing due to excavation activities, it is not yet possible to select a final remedy for OU III surface water and ground water. However, this interim remedial action is prudent to prevent exposure to contaminated ground water and to further reduce contaminant mass in surface water and ground water. This interim remedial action will be ongoing until the final remedy for OU III surface water and ground water is implemented. The major components of this interim remedial action for OU III surface water and ground water include

- Using institutional controls to restrict use of contaminated ground water.
- Continuing ground-water extraction and treatment during excavation and dewatering of the landfill site and continuing, if necessary, after Millsite excavation in areas of concentrated contamination.
- Continuing monitoring efforts, including surface-water and ground-water sampling, to better understand effects of Millsite remediation on water quality.
- Installing a pilot-scale treatability study (PeRT wall) downgradient (east) of the Millsite to assess its effectiveness in reducing contaminant levels in OU III surface water and ground

water.

Declaration

This interim remedial action is protective of human health and the environment, complies with Federal and State applicable or relevant and appropriate requirements directly associated with this action, and is cost-effective. Although this interim remedial action is not intended to fully address the statutory mandate for permanence and treatment to the maximum extent practicable, this interim remedial action utilizes some treatment and thus is in furtherance of that statutory mandate. Because this action does not constitute the final remedy for OU III surface water and ground water, the statutory preference for remedies that employ treatment that reduces toxicity, mobility, or volume as a principal element, although partially addressed in this remedy, will be addressed by the final response action. Subsequent actions are planned to address fully the threats posed by the conditions at this portion of OU III. Soils and sediments associated with OU III are being remediated as a separate removal action that is being conducted in accordance with an Action Memorandum addressing that removal action (DOE 1998a). Because this is an interim remedial action ROD, review of this site and of this remedy will be continuing as the final remedial alternatives for OU III are developed.

Document Number Q0011601
Declaration

RECORD OF DECISION
FOR AN INTERIM REMEDIAL ACTION AT
OPERABLE UNIT III---SURFACE WATER AND GROUND WATER
MONTICELLO MILL TAILINGS SITE, UTAH

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DECISION SUMMARY FOR THE
INTERIM REMEDIAL ACTION
RECORD OF DECISION

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1.0 Site Name, Location, and Description

The Monticello Mill Tailings Site (MMTS) is located in southeast Utah, in and near the city of Monticello in San Juan County (Figure 1-1); the city of Monticello has a population of approximately 1,900. Operable Unit (OU) III encompasses ground water and surface water at and downgradient of the Monticello Millsite, as well as contaminated soil and sediment deposited downstream of the Millsite in and adjacent to Montezuma Creek. The Millsite is a 110-acre tract of land owned by the U.S. Department of Energy (DOE). Mill tailings and associated contaminated material remain on the Millsite as a result of historical vanadium and uranium milling operations. An estimated 200,000 cubic yards (yd 3) of contaminated material has been identified in the former mill area, and approximately 2.1 million yd 3 of tailings and contaminated soil have been identified in the tailings-impoundment area of the Millsite. The tailings were contained in four piles within the floodplain of Montezuma Creek and are in hydraulic contact with a shallow alluvial aquifer underlying the site. The tailings are the primary source of contamination in ground waiter, surface water, soil, and sediment within OU III Surface-water and ground-water contamination are the subject of this interim remedial action Record of Decision (ROD).

A detailed description of OU III is presented in the remedial investigation report for OU III (DOE 1998b). MMTS is located in the east-central part of the Colorado Plateau physiographic province. The Abajo Mountains, Great Sage Plain, and Blanding Basin are the three physiographic subdivisions that dominate the landscape in the Monticello area. Approximately 5 miles west of Monticello, the Abajo Mountains, reaching elevations above 11,000 feet (ft), rise more than 4,000 ft above the broad, nearly flat, upland surface of the Great Sage Plain. A canyon network consisting of the upper part of Montezuma Creek and its tributaries has incised the western part of the Great Sage Plain. Montezuma Creek canyon becomes more deeply incised as the creek flows southward into the Blanding Basin.

The Millsite and adjoining areas within the Montezuma Creek valley are underlain by two ground water-bearing units (aquifers). The upper unit is the alluvial aquifer consisting of unconsolidated soil, sediment, and rock. The water table is generally 2 to 10 ft below the ground surface. The alluvial aquifer both discharges ground water to and receives surface water from Montezuma Creek depending on location. The alluvial aquifer and Montezuma Creek have been contaminated by past Millsite activities. The contaminants that present the greatest risks at the site include uranium, vanadium, lead-210, and arsenic. A lower sandstone aquifer within the Burro Canyon Formation, is locally separated from the alluvial aquifer by sandstones and shales of the Mancos Shale and the Dakota Sandstone Formations that restrict vertical ground-water movement. The Burro Canyon Formation is used as a secondary source of potable water.

The upper surface of the Burro Canyon Formation is about 125 ft below the ground surface in the west end of the Millsite and 60 ft below ground surface immediately east of the Millsite. About 4,000 ft east of the Millsite, erosion has removed the entire thickness of the relatively impermeable beds of the Mancos Shale and Dakota Sandstone Formations and the alluvial aquifer and Burro Canyon aquifer are in direct contact. Where the aquifers are in direct contact, ground water flows upward from the Burro Canyon aquifer into the alluvial aquifer. The upward movement of Burro Canyon ground water seems to have prevented contaminant movement from the alluvial aquifer to the Burro Canyon aquifer.

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MMTS is a former uranium and vanadium ore-processing mill that was placed on the National Priorities List (NPL) in 1989, because of potentially elevated risks associated with contaminated materials related to past milling activities. The Millsite and nearby contaminated properties are currently being remediated in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). Surrounding private lands are used for residential, recreational, and agricultural (both farming and grazing) purposes. Ground water within the alluvial aquifer is not currently used for any domestic, agricultural, or industrial purpose. Water from Montezuma Creek is used for agricultural purposes.

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2.0 Site History and Enforcement Activities

2.1 Site History

The site operated from the mid-1940s until 1960 to produce materials used in the production of steel and construction of nuclear weapons. Initially, the mill was built to produce only vanadium for the purpose of hardening steel needed for World War II With the scale-up of the nuclear weapons program, the site began processing domestic uranium ore as well. Uranium and vanadium ores that were mined from across the region were transported to the Millsite for milling and refining. The uranium concentrate was shipped to production facilities that manufactured nuclear weapons components; vanadium concentrate was shipped to steel-producing facilities. Processing of the ores resulted in the generation of mill tailings, which were disposed on the site in four taidings piles. The tailings contain elevated concentrations (compared to background) of a variety of radioactive materials and heavy metals that pose risk to human health and the environment.

The tailings piles were covered with soil and seeded with native grasses in the early 1960s to prevent erosion by wind and water. However, the high water content in the tailings and infiltration of precipitation provided a continuing source of ground-water contamination as it seeped through the subsurface over time. Some of the piles extend into the alluvial aquifer water

table and contaminants are leached by ground water. Montezuma Creek becomes contaminated as contaminated ground water discharges to the surface water cast of the Millsite. Contamination of the creek also occurs as it flows through contaminated soils and sediments. Prior to Millsite excavation, seeps emanating from the tailings piles also contributed to Montezuma Creek contamination.

2.2 Investigation History

Environmental investigations of the MMTS have been conducted at and near OU III since the early 1950s. Investigations performed before 1979 focused primarily on surface-water quality in Montezuma Creek and to a lesser degree on ground-water quality in the alluvial aquifer. Before the mill closed in 1960, investigations focused on the effects on surface-water quality in Montezuma Creek from milling operations, stream overflow, and seepage from tailings ponds and piles. Those early investigations assessed effects on the surface water and ground water largely on the basis of uranium and radium-226 concentrations in samples collected upstream and downstream of the Millsite. As early as 1950, radium levels in Montezuma Creek were known to be increasing as a result of releases from uranium milling. Between 1960 and 1979, surface-water samples were occasionally collected from Montezuma Creek to assess site impacts to surface-water quality. Ground-water sampling was also performed during this period. An environmental assessment report (Bendix 1980) noted an increase in uranium and radium concentrations in Montezuma Creek as a result of the facility. This 1980 report also noted an indication of ground-
water contamination downgradient (east) of the Millsite.

Environmental investigations performed between 1979 and October 1992 were more comprehensive than earlier studies. Routine monitoring of surface water and ground water from 1979 to 1991 is documented in annual environmental monitoring reports [Bendix (1980), Korte and Thul (1981 to 1984); Korte and Wagner (1985, 1986); Sewell and Spencer (1987); and

DOE (1988a, 1989, 1990a, 1991, 1992)]. More recent efforts have focused on supplementing monitoring data with information needed tocomplete ground-water modeling as part of the remedial investigation for OU III. Ongoing activities associated with the site include continued monitoring and collection of surface-water and ground-water data to be used in evaluating final cleanup alternatives.

2.3 Enforcement Activities and Administrative History

The administrative history of OU III is intricately linked with the histories of OU I and OU II, the
other components of the MMTS. OU I addresses excavation of mill tailings and other contaminated materials from the Millsite and containment of these materials in a permanent repository; OU II addresses the remediation of peripheral properties that are contaminated by radioactive material from the Millsite. In December 1988, DOE, the U.S. Environmental Protection Agency (EPA), and the State of Utah (State) entered into a Federal Facilities Agreement (FFA) (DOE 1988b) pursuant to Section 120 of CERCLA, for the MMTS. A Hazard Ranking System score was developed that led to the inclusion of MMTS on EPA's National Priorities List on November 16, 1989.

The Monticello Vicinity Property site was listed on the National Priorities List in 1986 and consists of 420 contaminated vicinity properties grouped into 8 operable units. Contamination of these properties occurred when mill tailings from the Millsite were wind blown off the Millsite or used as fill or other similar purposes. A ROD was signed for the Monticello Vicinity Property site in 1989. Approximately 414 of the properties have been remediated to date. Contaminated material from the vicinity properties was placed at the Millsite for later disposal in the

repository.

As stated in the FFA, DOE serves as the Federal lead agency and provides the principal staff and resources to plan, direct, and implement response actions at the MMTS. EPA and the State share the responsibility for oversight of the MMTS activities performed under the FFA. However, EPA has ultimate responsibility and authority for program oversight. Oversight by the State is performed by the Utah Department of Environmental Quality.

In 1990, the FFA parties signed a ROD (DOE 1990b) for the MMTS, which stipulated that contaminated materials from OUs I and II would be excavated and placed in an on-site repository; approximately 1,800,000 yd 3 of tailings and contaminated soil were identified at that
time. The ROD for MMTS also stipulated that a ROD for OU III would be produced when sufficient data were gathered through a focused remedial investigation/feasibility study and specified that "the Upper and Lower Montezuma Creek peripheral properties" (which are now referred to as Upper, Middle, and Lower Montezuma Creek) would be remediated as part of OU III. Remediation of OUs I and II is currently being implemented pursuant to the 1990 ROD. OU I is scheduled for completion, as defined by concurrence on the Millsite Restoration Remedial Action Report, by October 2001.

OU III soil and sediment cleanup are being conducted as a non-time critical removal action that will be completed in the summer of 1999 (DOE 1998a). The selected action involves excavation of contamination in discrete areas to alternate cleanup levels through the application of supplemental standards to comply with 40 Code of Federal Regulations (CFR) Part 192 requirements, and implementation of institutional controls (restrictive easements) to ensure that

habitable structures are not built within the OU III contaminated soil and sediment areas. These actions reduce risk from exposure to contaminants and remove the continued soil and sediment source to surface-water and ground-water contamination.

2.4 Highlights of Community Participation

The public participation requirements of CERCLA Section 113(k)(2)(B)(i-v) and Section 117 are being followed for this interim remedial action. MMTS has a Community Relations Plan that is updated annually; the 1999 Plan is currently undergoing revision. The community relations activities include (1) distribution of fact sheets and other written materials, (2) news releases to
the local newspaper, (3) public meetings, (4) display ads announcing the availability of key documents and meetings, (5) public comment periods, and (6) responsiveness summaries for Records of Decision.

Copies of all site-specific documents used in developing the interim-action decision were made available to the public through the Administrative Record for the site. The Administrative Record
is housed at the Monticello City Offices and at the DOE-Grand Junction Office. Draft versions of the OU III Remedial Investigation and Alternatives Analysis documents were released in January 1998 (DOE 1998c and DOE 1998d) and the Feasibility Study and Proposed Plan in March 1998 (DOE 1998e and DOE 1998f). These documents were placed in the reading room and Administrative Record in March 1998, prior to the start of the public comment period. Copies of the Proposed Plan (DOE 1998f) for an interim remedial action at OU III were also placed in the site Administrative Record and distributed to stakeholders in March 1998. The

notice of availability for all these documents was published in the local Monticello newspaper on March 18, 1998. A public comment period on the interim remedial action was held from March 27 to April 27, 1998, and a public meeting was held on April 7, 1998. At this meeting, representatives from DOE, EPA, and the State answered questions about the site and the preferred alternative, which has become the selected interim remedial action. A summary of the meeting and public comments received at that meeting and during the public comment period are presented in the Responsiveness Summary of this document (Appendix A) for inclusion in the Administrative Record. The decision for an interim remedial action at this site is based on information in the Administrative Record.

2.5 Scope and Role of Operable Unit III Surface Water and Ground Water Within Site Strategy

OU III is one of three OUs at the MMTS. A draft remedial investigation and feasibility study have been completed for OU III. A ROD was signed for OUs I and II which stipulated that contaminated materials from OUs I and II would be excavated and placed in an on-site repository. OU III surface-water and ground-water quality is expected to be positively affected by remediation of OUs I and II and by excavation of OU III soils and sediments as specified in the Action Memorandum (DOE 1998a). Because it is not possible to definitively predict the effects remediation will have on OU III, the interim remedial action is designed to (1) prevent the use of contaminated ground water by implementing institutional controls, (2) remove soluble contaminants from the ground water and, in turn, surface water, by treating extracted ground water through dewatering activities, (3) continue to monitor the changing conditions in the alluvial aquifer and in surface water, and (4) examine the feasibility of a PeRT wall for in-situ

treatment by conducting a pilot-scale treatability study. Treated water (generated by treating water pumped during Millsite excavation or, if necessary, following Millsite excavation) will meet Utah Pollutant Discharge Elimination Systems (UPDES) requirements. The interim remedial action will complement OU I and OU III soil and sediment cleanup activities and will have no negative effect on these cleanup efforts. The interim remedial action is consistent with the long-term strategy for surface-water and ground-water cleanup and will not adversely affect the final remedy for OU III

3.0 Summary of Site Characteristics

3.1 Hydrologic Setting

3.1.1 Surface Water

The following discussion is summarized from the OU III Remedial Investigation report

(DOE 1998c).

The primary surface-water body in the OU III area is Montezuma Creek, which flows west to east throughout most of the OU III area. Approximately 2.5 miles east of the Millsite, Montezuma Creek is joined by a lesser tributary, Vega Creek, at which point stream flow is south through Montezuma Canyon (Figure 1-1). Other surface-water bodies include seeps and springs, municipal water-treatment lagoons, Loyd's lake, and various ponds used to water livestock.

Typical flow rates in Montezuma Creek in the OU III area are about 1 cubic foot per second. Flow is generally perennial; however, portions of the creek are seasonally dry some years. Peak flow of 30 cubic feet per second may occur during spring runoff. Sources to Montezuma Creek are the in-stream base flow entering the Millsite near Highway 191, run-off from the surrounding watershed, and any inflow or gain of shallow ground water.

The State of Utah groups surface waters of the State into classes so as to protect against controllable pollution for the, beneficial uses designated within each of those classes (R317-2-6, U.A.C.). Four broad classes of use are recognized-domestic (1), recreational (2), aquatic (3), and agricultural (4). Additionally, subclasses are identified within some of these
classes (e.g., 2A, 2B, etc.). Higher standards of water quality apply to lower numbered classes and to those subclasses having letters earlier in the alphabet.

Montezuma Creek water is not used as a source of potable water; however, it is used as a water source for livestock. Montezuma Creek is classified in the Utah Administrative Code as follows:

1C-Protected for domestic purposes with prior treatment processes as required by the Utah Division of Drinking Water.

2B-Protected for secondary contact recreation such as boating, wading, or similar uses.

3A-Protected for cold water species of game, fish, and other cold water aquatic life, including the necessary aquatic organisms in their food chain.

4-Protected for agricultural uses including irrigation of crops and stock water.

3.1.2 Ground Water

The hydrologic units associated with OU III are an upper alluvial aquifer consisting mostly of Quaternary alluvium and colluvium, an aquitard of Mancos Shale and Dakota Sandstone, and the underlying Burro Canyon Formation aquifer. Below the Burro Canyon aquifer is the Brushy Basin Member of the Morrison Formation, which is relatively impermeable to ground-water

flow. Ground-water flow in the alluvial aquifer is generally to the cast, parallel to the axis of
Montezuma Creek. Flow rates of water moving past the eastern edge of the Millsite are approximately 40 to 50 gallons per minute.

The saturated thickness of the alluvial aquifer ranges from approximately 2 to 25 ft but is generally less than 15 ft. The alluvial aquifer is recharged by infiltration of precipitation, surface-
water loss from Montezuma Creek, and lateral ground-water flow from upgradient of the Millsite. Leaking water lines, from the city of Monticello water supply system, are suspected to recharge the aquifer in the northwest portion of the Millsite. Depths to ground water generally range from 8 to 15 ft. However, in the northwest area of the Millsite, and in areas of eastern

Upper Montezuma Creek, ground water is present within several feet of ground surface.

As with surface water, the State of Utah also classifies ground-water resources (R317-6, U.A.C.). The following ground-water designations have been established:

Class IA-Pristine Ground Water
Class IB-Irreplaceable Ground Water
Class IC-Ecologically Important Ground Water
Class II-Drinking Water Quality Ground Water
Class III-Limited Use Ground Water
Class IV-Saline Ground Water

Class IA ground water has the most stringent water quality standards; Class IV has the least stringent. The alluvial aquifer is not curiently used for drinking water, irrigation, or livestock watering; because it could be a potential source of drinking water in the future, Utah ground-water standards classify the alluvial ground water as Class II.

The Mancos Shale and Dakota Sandstone act as aquitards between the alluvial aquifer and the underlying Burro Canyon aquifer in the Millsite area. Ground-water flow within these aquitards is minimal and predominately vertically downward.

The Dakota Sandstone has been eroded away and the alluvial aquifer is in direct contact with the Burro Canyon Formation in the Montezuma Creek Valley approximately 4,000 ft east of the Millsite, Grouqd water discharges from the Burro Canyon aquifer to the alluvial aquifer and Montezuma Creek within the valley where Dakota Sandstone is absent. Discharge also occurs from cliff outcrops along the margin of Montezuma Canyon below the Vega Creek confluence. The primary recharge zone for the Burro Canyon aquifer is in outcrop areas on the east side of the Abajo Mountains.

The thickness of the Burro Canyon Formation is 114 ft approximately 600 ft east of the Millsite. The depth from ground surface to the potentiometric surface at this location is about 33 ft. The potentiometric surface of the Burro Canyon aquifer is above ground surface in the easternmost portion of Upper Montezuma Creek, where the farthest downgradient monitoring wells are located.

The city of Monticello occasionally withdraws Burro Canyon ground water from city-owned wells for non-potable use only. Burro Canyon ground water has also been used by private households. Most of the wells are old and have not been used for several years; however, some wells have been used during the last 10 years for domestic irrigation and for watering livestock.

3.2 Operable Unit III Source Areas

Based on previous investigations, including the Remedial Investigation for OUs I and II (DOE 1990c), the primary source of ground-water contamination associated with OU III are the mill tailings piles on the Millsite (OU I). To a lesser extent, contaminated soils and sediments in the floodplain of Montezuma Creek could serve as a secondary source of ground-water contamination, but the results from surface-water sampling indicate this is not a significant source.

3.3 Nature and Extent of Contamination

Monitoring data indicate that ground-water contamination is restricted to the alluvial aquifer; the contaminant plume follows Montezuma Creek and extends approximately one mile east of the Millsite. Sediment contamination extends further down Montezuma Creek, past the confluence with Vega Creek. Monitoring data also indicate that surface water in Montezuma Creek is contaminated throughout the OU III area. Removal of the major source of ground-water contamination (the tailings piles), including associated dewatering and treatment, through remediation of OU I is expected to have a major positive effect on the quality of OU III ground water and surface water. The full effect of the OU I remediation on ground-water and surface-water quality will not be known for some time. Implementing the proposed interim remedial action ensures protectiveness of human health and the environment until sufficient infonnation is available to make a final remedial action decision. Contaminated media are discussed further below.

3.3.1 Surface-Water Contamination

Surface-water samples collected from seeps and springs on the Millsite and from Montezuma Creek on and downstream ofthe Millsite contain elevated concentrations (relative to background) of various metals, uranium decay-series radionuclides, sulfate and nitrate. The highest concentrations were detected in samples collected from tailings pile seeps on the Millsite.
One or more samples collected from the seeps contained arsenic, copper, radium-226, selenium, and gross alpha that exceeded Utah surface-water quality standards. Among samples collected from Montezuma Creek on the Millsite, only selenium and gross alpha were detected in concentrations above a Utah surface-water standard.

Downstream of the Millsite, concentrations of arsenic, copper, manganese, molybdenum, selenium, uranium, vanadium, and gross alpha exceed background concentrations. Contaminant concentrations generally dearease with distance from the Millsite and generally reach background concentrations in the easternmost section of OU III. Copper and selenium concentrations sporadically exceeded Utah standards in samples collected at different monitoring locations throughout the remedial investigation. Only uranium, gross alpha activity, and manganese were detected above background levels throughout OU III. Elevated manganese concentrations in the

surface water at distances greater than 4,000 ft from the Millsite are attributed to discharge of Burro Canyon ground water which is naturally high in manganese. The Utah standard for gross alpha activity was exceeded consistently throughout the remedial investigation at all downstream sampling locations. The high gross alpha activity is attributed to uranium in surface water. With the exception of gross alpha, all contaminants in OU III downgradient from the Millsite are reduced to levels suitable for any purpose relative to Utah surface-water quality standards. Table 3.3.1-1 compares surface-water sample results with the applicable standards for all contaminants that were detected above a standard in one or more sample collected since November 1992. The Millsite sample concentrations include samples collected from the tailings pile seeps. The UCL 95 values represent the 95 percent upper confidence limit of the mean concentration computed from all samples collected from each Millsite and downstream surface-water monitoring location, respectively, between November 1992 and April 1996.

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Surface-water data obtained since November 1992 (DOE 1998c, e) indicate that concentrations of several contaminants decreased at some locations in Montezuma Creek after flow from a tailings pile seep was intercepted between October 1994 and April 1995. The monitoring data for the periods prior to and after ditch construction do not indicate significant changes in concentrations during the respective periods suggesting quasi steady-state conditions have been achieved with respect to other sources. However, some contaminants indicate a trend of slightly decreasing concentrations. High-flow during the spring has a variable effect on concentrations; both a decrease and an increase in concentrations are seen.

3.3.2 Ground-Water Contamination

Ground-water samples from wells completed in the alluvial aquifer contained elevated concentrations (relative to background) of various metals, uranium decay-series radionuclides, sulfate, and nitrate. The highest concentrations were detected in samples collected from wells on
the Millsite. Arsenic, manganese, molybdenum, selenium, vanadium, uranium, and lead-210 have migrated through the alluvial aquifer off the Millsite and have contaminated the alluvial ground water on private property cast of the Millsite (Figure 3.3.2-1). Selenium, nitrate, and

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radium-226/228 were detected in concentrations above Federal/State regulatory standards on the Millsite only. Molybdenum, selenium, and uranium were detected in concentrations above regulatory standards both on the Millsite and downgradient of the Millsite. The downgradient extent of uranium, which has migrated the farthest in the alluvial aquifer, is approximately 5,000 ft from the eastern Millsite boundary. The volume of uranium-contaminated ground water greater than the Uranium Mill Tailings Radiation Control Act (UMTRCA) ground-water standard of 30 pCi/L (or 44 µg/L) is estimated to be 97,000,000 gallons. Contaminants that were detected in excess of various ground-water regulatory standards in one or more samples collected during the remedial investigation are listed in Table 3.3.2-1. The UCL 95 values represent the 95 percent upper confidence limit of the mean concentration computed from all samples collected from each Millsite and downstream monitoring well, respectively, between November 1992 and April 1996.

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Contaminant concentrations in ground water generally decrease with distance from the Millsite. Just east of the Millsite, concentration contours change direction from being predominantly east-
west (parallel to ground-water flow on the Millsite) to being northwest to southeast. The concentration contours immediately east of the Millsite are consistent with the change in ground-
water flow direction, which generally follows the alignment of the historic natural channel of Montezuma Creek in that area.

The ground-water data collected since November 1992 during the remedial investigation (DOE 1998c) do not indicate significant changes in concentration over time, which suggests that the plumes had generally reached near steady-state conditions with respect to contaminant

sources on the Millsite prior to OU I rernediation. At some monitoring locations the concentrations of some contaminants are consistently lower during seasonal high-flow periods (high water levels and greater dilution) relative to low-flow periods. At other locations, some contaminants exhibit the opposite relationship between flow conditions and concentrations.

Burro Canyon ground water is not contaminated. The Mancos Shale and Dakota Sandstone appear to be adequate aquitards in areas where the water level is the alluvial aquifer is greater
than that in the Burro Canyon aquifer (downward flow potential). East of the Millsite, where the alluvial aquifer directly overlies the Burro Canyon aquifer, there is upward flow from the Burro Canyon aquifer to the alluvial aquifer which prevents contaminant movement into the Burro Canyon aquifer. In these eastern areas, the alluvial aquifer ground-water quality is strongly affected by influx from the Burro Canyon aquifer.

3.4 Conceptual Model of Contaminant Transport

Table 3.4-1 summarizes the potential human-health exposure pathways for all of OU III. Although the pathway of most concern for ground water is ingestion as a drinking water source, interaction of ground water with other media (e.g., by irrigation, discharge to surface water) can
have an effect on risk posed by other pathways. A secondary pathway of exposure, ingestion of beef or game that ingest contaminated vegetation, water, and soil was also evaluated.

Table 3.4-1 Human Exposure Pathway Analysis Summary

Exposure Medium	Potential Routes of Exposure	Potential Receptors	Comments
Air	Inhalation	Agricultural workers, recreational users, future residents	Particulate inhalation
Soil and sediment	Ingestion, inhalation, direct radiation exposure (gamma)	Agricultural workers, recreational users, future residents	Incidental ingestion, inhalation of dust
Surface water	Ingestion (incidental)	Agricultural workers, recreational users, future residents	Dermal exposure is insignificant when compared to ingestion.
Ground water	Ingestion (as a drinking water source)	Future residents	Currently not a complete pathway; this is an improbable, but potentially complete future exposure

path way.

Beef/game tissues	Ingestion	Agricultural workers, recreational users, future residents	Beef/game are exposed to contaminated vegetation, surface water, and soil.

Figure 3.4-1 depicts the ecological conceptual site model. This model considered effects of contaminant uptakes in vegetation in contact with contaminated surface water or ground water and subsequent ingestion of this vegetation as a major food source. The effects of ingesting contaminated prey (e.g., swallows, flying insects) were also evaluated as well as the effects from the use of contaminated surface water as a primary source of water for ingestion. The likelihood of exposure from any of the potential pathways is discussed in Section 4.0.

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4.0 Summary of Site Risks

This section presents a semiquantitative description of the potential risks associated with surface water and ground water at OU III.

4.1 Human-Health Risks

The Baseline Human Health Risk Assessment for OU III (DOE 1998g) indicated that the most significant exposures could occur from the potential future ingestion of contaminated ground water. This ground water is currently not used for domestic purposes and its lack of palatability makes its future use unlikely, though this possibility was evaluated. If the alluvial ground water was used as a source of drinking water, significant long-term risks would occur from both carcinogens (contaminants that cause cancer) and noncarcinogens (contaminants that cause other negative health effects except cancer). Risks were calculated for both a reasonable maximum exposure (RME; above average, but within the range of possible values) and a central tendency (CT) exposure (average or best-estimated).

For carcinogens, using the RME scenario, approximately 4 in 10,000 people could develop cancer from drinking the alluvial ground water over a lifetime (assumed to be 70 years). This is four times greater than the upper end of a risk range used by EPA to evaluate risks from carcinogens. Using the CT scenario, risks of developing cancer are 9 in 100,000 people; this is within EPA's acceptable risk: range. For noncarcinogenic contaminants, the RME risk would be 10 times greater than the value defined as acceptable by EPA; CT risks for noncarcinogens would be 5 times EPA's acceptable value. Risks calculated for the CT scenario from carcinogens related to OU III are 10 to 14 times those associated with background contaminant concentrations. Risks associated with noncarcinogens are 42 times background. The

contaminants that pose the greatest amount of risk include uranium, vanadium, lead-210, and arsenic. More details on the actual numerical values associated with site contaminants and their interpretation was presented in the Baseline Human Health Risk Assessment.

The most likely future use of-the Millsite is for recreational purposes. The community has a strong interest in expanding its existing nine-hole golf course to an eighteen hole golf course that would encompass the Millsite. It is assumed that future residential development will occur east of the Millsite, and these future residents are the most likely receptors. Risks from ingestion of surface water were evaluated along with other pathways under a recreational/agricultural use scenario. This scenario assumes Montezuma Creek could be used for hunting, hiking, and other similar activities and that water would only be infrequently ingested in small amounts. Exposure associated with ingestion of surface water did not produce significant risk. Risks from eating game or beef that ingest contaminated soil, vegetation, and water were estimated by DOE to be negligible; contaminant levels in animals were measured by EPA and found to be safe.

4.2 Environmental Risk

Vegetation and Wildlife. DOE conducted an ecological risk assessment (DOE 1998h) to evaluate potential risks to the environment associated with exposure to contaminants of concern within OU III. This assessment determined that surface-water ingestion is not a risk-driving pathway for environmental receptors and contaminated ground water is of negligible concern

because a direct exposure pathway does not exist between the receptors and ground water. The only receptors that potentially could be exposed to ground water directly are plants with roots deep enough to tap into the alluvial aquifer. Animals or aquatic organisms can be indirectly exposed to ground water by ingesting the plants that take up contaminated ground water or by ingesting or directly contacting certain surface waters that receive ground-water discharge. Results of the risk assessment indicate that these potential exposures to contaminated ground water do not pose an excess risk to environmental receptors.

Air quality. Air quality is not an issue with this site, except for any dust generated during remediation actions. Dust suppression measures will be taken during remediation to prevent dust generation.

Surface Water, Ground Water, and Wetlands. Surface-water and ground-water contamination are the focus of this interim remedial action. Both surface-water and ground-water quality are expected to improve through implementation of the interim remedial action though the action affects ground water directly. Sediments in the Montezuma Creek floodplain and wetland areas are also contaminated; these are being addressed through a separate removal action.

Scenic, Historic, and Cultural Resources. Scenic resources within the area include rural and pastoral views of the plains and mountains and picturesque views of canyon walls within the Montezuma Creek valley. Some of these views may be temporarily disturbed during construction, but effects will not be permanent. Historic and cultural resource surveys conducted within the OU III area revealed one historic site on the floodplain of Montezuma Creek and numerous prehistoric sites along the canyon walls of Upper, Middle, and Lower Montezuma Creek. The historic site is a homestead; the prehistoric sites are rock-shelters and open lithic scatters. The interim remedial action will not have an adverse effect on these sites.

4.3 Need for the Interim Remedial Action

The primary objectives of the interim remedial action are to prevent exposure to contaminated ground water and to reduce contaminant levels in ground water and surface water. The interim remedial action is needed primarily to achieve risk reduction in the near term by removing contamination (through dewatering and treatment) that is being disturbed through remediation of OUs I and II. This action will prevent further environmental degradation while a long-term solution for OU III can be evaluated. Institutional controls will prevent exposure to contaminated ground water while the near-term interim measures are being implemented. Monitoring data will provide information needed to develop a long-term solution as well as provide an assurance that any unexpected contaminant releases can be detected. PeRT wall treatability studies will assist in determining the viability of that technology as a longer term remedial alternative and may also serve as an enhancement to the overall interim remedial action.

5.0 Description and Comparison of Interim Remedial Action Alternatives

This section provides a brief discussion of the alternatives being considered for interim remedial action of OU III surface water and ground water. The Feasibility Study for OU III (DOE 1998f) contains an evaluation for a range of remedial alternatives that are being considered for the final remedial action at the site. The alternatives include a range of options for institutional controls (restrictive easements, deed annotation, administrative controls through the State) and ground-water extraction and treatment technologies (such as conventional water treatment and the PeRT wall). However, only two actions were considered to address the interim remedial action goals of exposure prevention and contaminant reduction.

5.1 The No-Action Alternative (Alternative 1)

Consideration of the no-action alternative is required by CERCLA. The no-action alternative for OU III surface water and ground water includes long-term monitoring. Monitoring is currently being conducted on a semiannual basis; this monitoring frequency would continue. Up to 24 wells are in the monitoring program, including 3 upgradient wells. Eight surface-water locations are sampled downstream of the Millsite, including 1 upstream location. All samples are analyzed for metal and radiologic COCs. Refer to the OU III Annual Monitoring Program (DOE 1997) for more details. The present plan for monitoring will be evaluated to determine if additional sampling locations are necessary and if the present frequency of sampling events is adequate to assess changing Millsite conditions and to support selection of the final remedy.

5.2 Institutional Controls, Millsite Dewatering and Treatment, Monitoring, and PeRT Wall Installation and Evaluation (Alternative 2)

Institutional controls prohibiting the use of water rights within the area of contaminated ground water will be implemented through the State Engineer. A moratorium on drilling of water wells into the contaminated aquifer will be put in place. Surface-water and ground-water monitoring

(as described above) will be used initially to assess the effects of Millsite cleanup activities on the concentration of contaminants in the ground water and Montezuma Creek and be used in subsequent ground-water modeling, if necessary. Additional wells will be installed and monitored to support evaluation of the PeRT wall treatability study.

In conjunction with the cleanup of OU I, ground-water dewatering and treatment will continue and also contribute to the remediation of OU III. Currently, water is being treated with a combination of chemical and physical processes. Chemicals are added to precipitate contaminants as particulates, which are filtered out using microfiltration and reverse osmosis. Secondary wastes are disposed in the onsite repository. Treated water is discharged to Montezuma Creek in accordance with UPDES requirements. Current treatment rates range from 50 to 200 gallons per minute. Following remediation of OU I, water treatment may continue, if necessary. Ground-water and surface-water monitoring will be conducted to determine the effectiveness of the PeRT wall and ground-water treatment in restoring the aquifer to natural conditions. A five-year review of the data will be conducted to determine the effectiveness of the interim remedial action.

conditions. A five-year review of the data will be conducted to determine the effectiveness of the interim remedial action.

In-situ treatment of ground water will be evaluated with a PeRT wall installed across the contaminant plume. The selected location for the PeRT wall is in the area east of Pond 3 (the collection pond for the water treatment plant located just east of the Millsite). The PeRT wall will be oriented perpendicular to the direction of ground-water flow; contaminants are removed as ground water flows through the wall, thereby preventing additional downgradient movement of contamination. The exact location of a PeRT wall is not yet finalized and much of the site-specific information needed has not been determined. Laboratory treatability studies are ongoing and field treatability studies will be completed to determine the optimum configuration of the PeRT wall.

The PeRT wall will be a funnel-and-gate system that consists of an impermeable barrier (such as a slurry wall or sheet piles) to direct ground-water flow through a gate made of reactive material.
The size of the wall selected for OU III will be optimized for site-specific geologic and hydrologic conditions, operation and maintenance (O&M) requirements, and economic considerations. Before emplacement of the PeRT wall, additional treatability studies will be conducted with various reactive materials to determine the most suitable material for site-specific conditions.

It is anticipated that the PeRT wall will operate for a minimum of 5 years, unless preliminary monitoring results indicate problems with the system. The wall may become part of the final proposed remedial action if monitoring demonstrates it is performing successfully. When the wall is removed at the end of its operation, the contaminated reactive materials will be disposed in an appropriate disposal facility.

Preliminary treatability study results for the PeRT wall are favorable. Using site-specific

waters,
materials tested have shown to be effective at removing contaminants of concern, especially uranium. As with many processes, some uncertainty regarding performance exists in scaling up from laboratory to full-scale implementation. Field installation of the PeRT wall is expected to begin in the spring of 1999 and be completed by the end of the year. Monitoring is ongoing. Additional wells will be installed in conjunction with PeRT wall construction to assess its performance. An annual review of the data collected will be conducted to determine the effectiveness of the PeRT wall.

This alternative complies with applicable or relevant and appropriate requirements (ARARs) to the maximum extent practicable, given the limited nature of the interim remedial action. All data
collection activities (including new well installation, water sampling, etc.) will take place in accordance with established protocols and procedures, including those regarding disposal of investigation-derived waste (GJO 1997 and MACTEC 1996). Treatment and discharge of water through dewatering activities will meet UPDES requirements. The interim remedial action will not meet federal or state drinking- or surface-water standards, but because the goal of the interim
remedial action is simply contaminant reduction in ground water, these specific standards are not
applicable to the proposed action.

5.3 Summary of Comparative Analysis of Alternatives

CERCLA requires that cleanup alternatives for a site be evaluated against nine criteria. These criteria and a comparative analysis are provided in Table 5.3-1 and discussed in the following sections.

Table 5.3-1 Comparison of the Alternatives Against the Nine CERCLA Criteria

Criteria	Alternative 1 No Action	Alternative 2 PeRT Wall, Monitoring, Dewatering and Treatment, and Institutional Controls
Overall Protection of Human Health and the Environment	Potential future risks posed. Allows unrestricted use of contaminated ground water.	Assumes protectiveness through use of institutional controls. Ground-water treatment will reduce contaminant mass.
Compliance with-applicable or relevant and appropriate requirements	Complies with ARARs applicable to interim remedial action.	Complies with ARARs applicable to interim remedial action. Will comply with construction and operational requirements. Will at least contribute to, or possibly meet, water-quality standards.

Short-term Effectiveness of limiting use of Expected to reduce ground-water treatment.	None; current conditions would exist.	Effective at meeting goal contaminated ground water. mass of contaminants with
Long-term Effectiveness are not required to provide although it is believed that this contribute toward meeting Institutional controls provide long ground-water use.	None, except by natural attenuation.	Interim remedial actions long-term solutions action will significantly long-term goals. term restrictions on
Reduction of Toxicity. Mobility will reduce mass of and Volume through Treatment downgradient of barrier. mobility of contaminants.	None, except through natural processes.	Dewatering with treatment contaminants on site and PeRT wall may reduce
Implementability standard construction expertise.	Implementable--represents current situation.	Implementable--uses practices and available
Cost $2,313,000 414,000	Capital $ 39,000 Annual O&M $161,000	Capital Annual
State Acceptance Acceptable	Not acceptable	
Community Acceptance Acceptable	Less acceptable	

5.3.1 Threshold Criteria

Overall Protection of Human Health and the Environment

Alternative 2 is anticipated to be protective of human health and the environment by preventing exposure to contaminated ground water through the use of institutional controls, which will (1) lock out existing water rights, if any, and (2) place a moratorium on new water well drilling into the contaminated alluvial aquifer. Treatment of ground water collected during excavation dewatering activities will remove contaminants from the aquifer. Discharge of treated water to Montezuma Creek will comply with UPDES requirements. The pilot-scale treatability study of the PeRT wall will evaluate its effectiveness in reducing contaminant levels downgradient of the Millsite. The PeRT wall is designed to act as a "filter" to retain contaminants at the wall and release clean water downgradient.

Alternative 1 could lead to potential future risks associated with use of contaminated ground water. No restrictions would be placed on use of ground water. Wells could be drilled into the alluvial aquifer and used for domestic purposes, resulting in unacceptable risks to users.

Compliance with Applicable or Relevant and Appropriate Requirements

Background

Section 121(d)(1) of CERCLA, as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), requires that the interim remedial action proposed for OU III must attain, to the extent practical under the selected interim remedial action, a degree of cleanup that ensures protection of human health and the environment. In addition, remedial actions that leave any hazardous substances, pollutants, or contaminants on site must, upon completion, meet a level or standard that at least attains legally applicable or relevant and appropriate standards, requirements, limitation, or criteria that are ARARs under the circumstances of the release. ARARs include Federal standards, requirements, criteria, and limitations and any promulgated standards, requirements, criteria, or limitations under the State environmental or facility siting regulations that are more stringent than Federal standards. In addition, the State ARARs include all promulgated standards and rules associated with delegated State environmental programs and those State regulations with no corresponding Federal regulations.

Applicable requirements are those cleanup standards, standards of control, and other substantive environmental protection requirements, criteria, or limitations promulgated under Federal or State law that specifically address the hazardous substances, pollutants, or contaminants, remedial action, location, or other circumstances at the OU III site. Relevant and appropriate requirements are cleanup standards, standards of control, and other substantive environmental protection requirements, criteria, or limitations promulgated under Federal or State law that, while not applicable to the hazardous remedial action site, address problems or situations sufficiently similar that their use is well-suited to the site.

The criteria for evaluating which requirements are applicable or relevant and appropriate differ depending on whether the requirement is chemical-, action-, or location-specific. According to the NCP, chemical-specific ARARs are usually health- or risk-based numerical values that establish the acceptable amount or concentration of a chemical that may remain in, or be discharged to, the ambient environment. Action-specific ARARs are usually technology- or activity-based requirements or limitations on actions taken with respect to hazardous wastes, or requirements to conduct certain actions to address particular circumstances at the site. Location-specific ARARs generally are restrictions placed on the concentration of hazardous substances or the planned activities solely because they are in special locations. Examples of special locations include floodplains, wetlands, historic places, and sensitive ecosystems or habitats.

Comparative Analysis

Alternative 2 for OU III will meet the ARARs that are applicable or relevant and appropriate to this interim remedial action. Federal ARARS that potentially apply to the interim remedial action are summarized in Table 5.3.1- 1; State ARARs are summarized in Table 5.3.1-2. The OU III

Table 5.3. 1-1 Federal ARARs for OU III Surface Water and Ground Water

Standard, Requirement, Criterion, or Limitation	Citation	Description	Status	Comment
Safe Drinking Water Act	42 USC 300(g)	Establishes health-based standards for public water systems (maximum contaminant levels [MCLs]).	Not applicable as a goal for the interim action.	Because the quality of the alluvial aquifer could allow it to be used as a drinking water aquifer, the MCLs may apply as final cleanup standards. However, the interim action alone may not achieve these standards.
National Primary and Secondary Drinking Water Standards	40 CFR Part 141 40 CFR Part 143			
Clean Water Act Water Quality Criteria	33 USC 1251-1376 40 CFR Part 131 "Quality Criteria for Water	Criteria for states to set water quality standards on the basis of toxicity to aquatic organisms and human health.	Not applicable as a goal of the Interim action.	Addresses Montezuma Creek contamination. May not be achievable through the interim action alone.
National Pollutant Discharge Elimination System	40 CFR Parts 122 through 125	Establishes standards for discharges of pollutants into waterways and through the use of underground injection wells.	Applicable through the State.	A point source effluent discharge into Montezuma Creek will be used. Potential storm-water discharges into Montezuma Creek must be controlled.
Dredge or Fill Requirements (Section 404)	40 CFR Parts 230 and 231 33 CFR Part 323 40 CFR Part 404	Regulates the discharge of dredged or fill material into navigable waters and manages wetland areas.	Applicable as location- and action-specific requirement.	Dredged or fill material requirements applicable through the State of Utah standards. EPA has jurisdiction over wetlands at CERCLA sites in the State but no significant effects to wetlands are anticipated.
Clean Air Act	42 USC	Establishes standards for		

Applicable through the State of Utah standards as chemical-, location-, and action-specific requirement.	National Primary and Secondary Ambient Air Quality Standards	Seeks to protect and enhance the quality of the nation's air resources.	7401-7462 40 CFR Part 50	ambient air quality to protect public health and welfare.

Table 5.3.1-1 Federal ARARs for OU III Surface Water and Ground Water (continued)

Standard, Requirement Criterion, or Limitation	Citation	Description	Status	Comment
Resource Conservation and Recovery Act (RCRA) Applicable through the State of Utah Standards as chemical-, location-, and action-specific requirement.	42 USC 6901 40 CFR Parts 260-279	Regulates the generation, treatment, storage, and disposal of hazardous waste.	a	Hazardous waste is not known to exist within OU III. However, these regulations will apply it hazardous waste is generated during Installation of the PeRT wall.
Uranium Mill Tailings Radiation Control Act (UMTRCA) Not appropriate as a goal of the interim action.	42 USC 2022, 42 USC 7901-7942 40 CFR Part 192	Establishes health-based ground water remediation standards for inactive uranium processing sites.		The goals of the Interim remedial action are contaminant reduction and prevention of exposure. These ground-water standards may or may not be achieved.
Floodplain/Wetlands Environmental Review Applicable as a location- and action-specific requirement.	40 CFR Part 6, Appendix M	Establishes agency policy and guidance for carrying out the provisions of Executive Orders 11988,"Floodplain" Management," and 11990, "Protection of Wetlands."		Remediation actions could affect site floodplains and wetlands and will comply with requirements of the Monticello Wetlands Master Plan.

Table 5.3.1-2 State ARARs for OU III Surface Water and Ground Water

Department/Division	Subject	Statute	Rule	Comments
Department of Environmental Quality, Division of Drinking Water	Safe Drinking Water Rules	Title 19, Chapter 4. Utah Code Annotated (U.C.A.)	R309, Utah Administrative Code (U.A.C.)	The goals of the interim action are contaminant reduction in and prevention of exposure to contaminated ground water. These standards may or may not be met by the interim action alone.
Department of Environmental Quality, Division of Water Quality	Standards for Quality for Waters of the State	Title 19, Chapter 5, U.C.A.	R317-2, U.A.C.	The goals of the interim action are contaminant reduction in and Prevention of exposure to contaminated ground water. These standards may or may not be met by the interim action alone.
	Ground Water Quality Protection	Title 19, Chapter 5, U.C.A.	R317-6, U.A.C.	The goals of the interim action are contaminant reduction in and prevention of exposure to contaminated ground water. These standards may or may not be met by the interim action alone.
	Utah Pollutant Discharge Elimination System	Title 19, Chapter 5, U.C.A.	R317-8, U.A.C.	Applicable requirement. Discharge into Montezuma Creek will comply with the requirement of the permit. Potential storm-water runoff into Montezuma Creek will be controlled.
Department of Environmental Quality, Division of Air Quality	Utah Air Conservation Rules	Title 19, Chapter 2, U.C.A.	R307-1 and R307-12, U.A.C.	This is the State-implemented National Primary and Secondary Ambient Air Quality Standards program. These rules are applicable through the

State of Utah standards. Mitigative and

restrictive measures such as dust suppressants

and reduced speeds on access roads will be

used to limit dust emissions and meet fugutive

dust requirements.

Department of Environmental Quality, Division of Radiation Control	Radioactive Material Management	These provisions address the safe management, including disposal, of radioactive material. Installation of the PeRT wall will comply with these applicable state requirements.	Title 19, Chapter 3, U.C.A. R313-12, R313-15-301, R313-19 through R313-22,and R313-25-18 through R313-25-22, U.A.C.

Table 5.3.1-2 State ARARs for OU III Surface Water and Ground Water (continued)

Department/Division	Subject	Statute	Rule	Comments
Department of Environmental Quality, Division of Solid and Hazardous Waste	Hazardous Waste Management Rules (RCRA Subpart C)	Title 19, Chapter 6, Part 1, U.C.A.	R315, U.A.C.	These rules are applicable requirements through the State of Utah standards. Hazardous waste may be generated during installation or removal of the PeRT wall. Compliance with these requirements will be attained. Also, R315-101, Cleanup Action and Risk-Based Closure Standards, is of importance to the interim

remedial action because it establishes

requirements to support risk-based cleanup at

sites where remediation of hazardous

constituents to background levels will not be

achieved.

Department of Natural Resources, Division of Water Rights	Well-drilling standards (standards for drilling and abandonment of wells)	73-3-25(2)(b), U.C.A.	R655-4, U.A.C.

Includes such requirements as performance standards for casing joints and requirements for abandoning a well. Also included are water right

issues associated with consumptive use. This

law is applicable to all drilling anticipated and is

an applicable requirement.

Feasibility Study identified Federal and State ARARs that apply to the final remedial alternative.
Those requirements are more extensive than requirements for the interim remedial action because of differences in goals and scope. Because the goal of the interim remedial action is to prevent the use of contaminated ground water, reduce contaminant levels in the ground water and surface water, and to evaluate an innovative ground-water treatment technology, restoration of the contaminated aquifer to drinking-water standards is outside the scope of this interim remedial action. However, the interim remedial action should have a significant positive effect toward meeting these standards. Aquifer restoration will be addressed during selection of the final remedy for all of OU III. For this reason, regulations that address restoration of contaminated ground water are not ARARs for this interim remedial action. Those rules and regulations include maximum contaminant levels, the Utah ground-water quality standards, and the Safe Drinking Water Act. Mass contaminant reduction achieved by this interim remedial action will contribute to meeting ARARs for the final remedy.

Because Alternative 1 involves no action, and because the goals of the interim remedial action are not to meet drinking water standards, Alternative 1 complies with ARARs applicable to the interim remedial action. However, it does not meet the objectives of the interim remedial action to prevent exposure to and reduce contaminant mass in the alluvial aquifer.

5.3.2 Primary Balancing Criteria

Short-term effectiveness

Alternative 2 would include construction activities associated with the PeRT wall installation. Mitigative measures, such as dust suppression, would be implemented to minimize short-term impacts. Construction may generate noise and vibrations; heavy equipment use would be required. Activities that could cause disruptions to area residents will be implemented during the

times of day that minimize negative effects. The ground-water treatment portion of this alternative would cause short-term reductions of contaminant mass from the alluvial aquifer while a longer-term alternative is being evaluated. Implementation of institutional controls through the Utah State Engineer's office can be quickly accomplished and therefore will provide short-term effectiveness in preventing exposure to contaminated ground water.

For Alternative 1, only monitoring activities would be conducted. Workers conducting these activities would take appropriate precautions (e.g., following appropriate sample collection and handling procedures) to prevent exposure to contaminants. Small localized disturbances to soils and vegetation may occur with the installation and/or maintenance of monitoring wells, but environmental resources would not be significantly affected during the short term. This alternative would have no short-term effects on ground-water or surface-water quality.

Long-term effectiveness

Alternative 2 provides good long-term effectiveness through the use of institutional controls to restrict use of contaminated ground water. Dewatering and treatment of contaminated ground water will result in improved water quality in the alluvial aquifer. Though the interim remedial action is not intended as a long-term solution, it is a first step toward meeting long-term goals.

Long-term effectiveness will be evaluated through monitoring and modeling and a final solution will be selected at a later date.

Alternative 1 would result in a slow decrease in contaminant concentrations in the alluvial aquifer over time as the system attenuates naturally. Modeling indicates this attenuation would take greater than 100 years to return to acceptable concentrations. Additionally, this alternative
provides no controls to limit the use of or access to OU III ground water during the time contaminant concentrations are decreasing.

Reduction of Toxicity, Mobility, and Volume through Treatment

Dewatering and treatment of ground water through implementation of Alternative 2 results in an irreversible reduction of contaminant mass in ground water. The treatment process will remove contaminants from the ground water and immobilize the contaminants by placing them in the repository constructed for OU I. Discharge of treated ground water will meet UPDES requirements for surface water. If effective, the PeRT wall will achieve a reduction in mobility of
contaminants and a reduction in volume of the contaminant plume downgradient of the wall.

Alternative 1 does not achieve a reduction in toxicity, mobility, or volume through treatment.

Implementability

Alternative 2 is implementable. Institutional controls can be put in place and administered through the State Engineer. Monitoring and ground-water extraction/treatment are a continuation of ongoing activities and are therefore implementable. The PeRT wall is less proven, but treatability studies have shown that the technology is successful in removing contaminants of concern from site-specific ground-water samples. Use of the same technology in similar situations has been successful. Standard construction practices and materials are used for PeRT

wall installation; a number of vendors are available to supply each of the component parts and services.

Alternative 1 is implementable and represents the current situation.

Cost

For Alternative 1, capital costs are estimated at $39,000; O&M costs are estimated at $161,000 annually.

For Alternative 2, capital costs are estimated at $2,313,000; O&M costs are estimated at $414,000 annually.

Breakdown of costs for Alternative 2 are as follows:

Institutional Controls		
	Capital Costs	$ 20,000
Monitoring		
	Capital Costs	$ 39,000
	Annual Costs	$ 161,000
Geochemical Testing		
	Capital Costs	$ 52,000
PeRT Wall		
	Capital Costs	$2,203,000
	Annual Costs	$ 253,000

Costs for dewatering and treatment of the Millsite are not included in the estimate for Alternative 2, because currently, they are included as part of OU I and the need to continue those activities after Millsite excavation is completed is not known at this time.

5.3.3 Modifying Criteria

State Acceptance

Alternative 2 is acceptable to the State.

Alternative 1 is not acceptable to the State.

Public Acceptance

Public input was not specifically sought on the acceptability of Alternative 1. As support of Alternative 2 was made publicly, it can be assumed that Alternative 2 has more public support than Alternative 1. Generally, the public showed little interest in the OU III remedy selection process, but those involved reacted favorably toward the preferred Alternative 2. For more information see the Responsiveness Summary in this document (Appendix A).

EPA Acceptance

Because DOE was the lead agency for this interim remedial action, and because DOE is the agency proposing the action, EPA acceptance is also addressed here (though it is not one of the CERCLA criteria).

Alternative 2 is acceptable to EPA.

Alternative 1 is not acceptable to EPA.

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6.0 Selected Remedy

The selected interim remedial action for MMTS OU III is Alternative 2-Institutional Controls, Millsite Dewatering and Treatment, Monitoring, and PeRT Wall Installation and Evaluation. Institution controls will restrict the use of contaminated ground water while ground-water remediation is in progress. Access to water rights will be prohibited and a moratorium will be placed on drilling new water wells in the contaminated alluvial aquifer. These controls will be administered through the State Engineer. Monitoring will continue on a semiannual basis and be reviewed as data becomes available to assess the effectiveness of the interim remedial action. Monitoring will involve sampling up to 24 monitoring wells and 8 surface-water locations and analyzing for all metal and radionuclide COCs for OU III (DOE 1997). Ongoing Millsite dewatering and treatment will continue during the remediation of OU I and if determined necessary, will be continued after excavation of source material from the Millsite is complete. Water is currently undergoing chemical treatment followed by micro filtration and/or reverse osmosis. Secondary wastes generated are disposed in the on-site repository. Clean water is discharged to Montezuma Creek in accordance with UPDES requirements. Installation of the pilot-scale PeRT wall will determine the effectiveness of the technology in removing contaminants from the ground water at the MMTS.

Costs associated with this alternative are as follows:

Present worth (5-year period):	$4,010,400
Capital:	$2,313,000
Annual O&M:	$ 414,000

The PeRT wall is an innovative technology, so there are uncertainties associated with its performance. However, treatability studies have proven promising to date, and the technology has been used successfully at sites similar in nature to OU III. Performance of the PeRT wall will
be monitored on a regular basis, and if problems arise, steps can be taken to correct them. Additionally, a five-year review of the monitoring data will be conducted to assess the performance of the interim remedial action and assist in the development of the final remedial action for OU III.

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7.0 Statutory Determinations

The selected interim remedial action meets the statutory requirements of CERCLA. These statutory requirements include protection of human health and the environment, compliance with ARARs (within the scope of the interim remedial action), cost effectiveness, and use of permanent solutions and alternative treatment technologies to the maximum extent practicable. Water extracted through dewatering will be treated at the existing water treatment plant. If effective, the PeRT wall will treat contaminated ground water. The manner in which the selected interim remedial action for OU III meets each of the requirements is presented in the following discussion.

7.1 Protection of Human Health and the Environment

The interim remedial action is anticipated to be protective of human health and the environment by limiting exposure to contaminated ground water through use of institutional controls and by reducing contaminant mass in surface water and ground water downgradient of the Millsite. Implementation of the selected interim remedy is a preliminary step in achieving long-term protection.

7.2 Compliance with Applicable or Relevant and Appropriate Requirements

The interim remedial action selected for OU III will meet the ARARs that are applicable or relevant and appropriate to this interim remedial action. These ARARs include the National Pollutant Discharge Elimination System (administered through the State as the UPDES), the State of Utah's Hazardous Waste Management rules, and the Flood plain/Wetlands Environmental Review.

Aquifer restoration will be addressed during selection of the final remedy for all of OU III For this reason, regulations that address water quality standards are not ARARs for this interim remedial action though the interim remedial action should make progress toward meeting those standards. These standards include maximum contaminant levels, the Utah ground-water quality standards, and the Safe Drinking Water Act. Additional information regarding ARARs for the interim remedial action is provided in Tables 5.3.1-1 and 5.3.1-2.

7.3 Cost Effectiveness

Overall cost effectiveness can be defined as the overall effectiveness proportionate to cost, such
that an action represents a reasonable value. The selected remedy for OU III will prevent exposure to contaminated ground water at a reasonable cost, thus improving protection to human health and the environment. The selected interim remedial action has a cost that is within the same range as alternatives considered in the feasibility study for the site. If greater treatment
efficiency, cost effectiveness, or ease of implementability can be established at a later date,

other
alternatives would be considered.

7.4 Use of Permanent Solutions and Treatment Alternative Technologies or Resource Recovery Technologies to the Maximum Extent Practical

Ongoing dewatering and treatment of ground water at the Millsite fulfills this requirement. Contaminated water is treated to meet UPDES requirements before discharge to Montezuma Creek. Ground water is permanently treated by removal of contaminants by chemical and physical methods.

If the PeRT wall is effective, the final proposed remedial action for OU III may employ treatment through the use of an innovative technology. However, the reactive materials installed in constructing the PeRT wall may require recovery and disposition at an off-site disposal facility at some time in the future. Because this is only an interim remedial action measure, its effectiveness will be evaluated in the final feasibility study for OU III. This action utilizes permanent solutions and alternative treatment technologies to the maximum extent possible, given the limited scope of this action.

7.5 Preference for Treatment as a Principal Element

Water recovered during Millsite dewatering is being treated before discharge. If the PeRT wall is successful, it will treat ground water in situ. Thus, this alternative satisfies the preference for treatment as a principal element. The final decision document for the site will further address this preference as it relates to the final alternative selected for the site.

7.6 Balancing Criteria

The selected interim remedial action provides the best balance of tradeoffs compared with the no-action alternative with respect to the five summary balancing criteria, which include

- Long-term effectiveness and permanence.
- Reduction of toxicity, mobility, or volume through treatment.
- Short-term effectiveness.
- Implementability.
- Cost.

The criteria most critical in the selection of this remedy were short- and long-term effectiveness and reduction of toxicity, mobility, or volume through treatment. The no-action alternative

would
have no effect on site conditions and would not prevent exposure to contaminated ground water. The combination of institutional controls and Millsite dewatering and treatment prevents near-term exposure to ground water and reduces contaminant mass in the aquifer, contributing to long-term effectiveness.

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The selected remedy was the preferred alternative identified in the proposed plan. No significant
changes were made to the preferred alternative. Because the public meeting and comment period did not generate any significant comments opposed to the interim remedial action presented in the Proposed Plan, the selected remedy is assumed to have community acceptance.

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Responsiveness Summary

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Document Number Q001 1601 Appendix A

Overview

This Responsiveness Summary provides information about the views of the community with regard to the proposed interim remedial action for Operable Unit (OU) III ground water at the Monticello Mill Tailings Site (MMTS), documents how public comments have been considered during the decision-making process, and provides responses to concerns.

The public was informed of the selected remedial action in the following ways:

- All items contained within the Administrative Records have been on file at the subject repositories since the final, or in some cases draft final, version of each document was issued.
- A copy of the Proposed Plan for the interim remedial action was sent to interested stakeholders and was made available in the public reading room and at the public meeting.
- A public comment period was held from March 27, 1998, to April 27, 1998.

- A full page notice of the public comment period and public meeting was published in the local weekly newspaper before the public meeting.

- Notices of the public comment period and public meeting were prominently posted at several of the most frequented businesses in the Monticello area.

- A public service announcement was aired by a local radio station to notify listeners about the time and location of the public meeting.

- A public meeting was held on April 7, 1998, at the Monticello High School auditorium.

- Written comments by the public were encouraged.

The public meeting was sparsely attended. The few questions and comments that were received are summarized, along with responses, in this responsiveness summary. The selected remedy presented in the Proposed Plan was not modified based on any comments received. The public meeting also included a discussion of proposed cleanup of soils and sediments associated with OU III through a removal action. Comments received on the removal action are included in the Action Memorandum for that removal action.

Background on Community Involvement

The public participation requirements of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Section 113(k)(2)(B)(i-v) and Section 117 are being followed for OU III. MMTS has a Community Relations Plan that has been updated annually. The most recent revision of the plan is currently undergoing revision. The community relations activities include (1) distribution of fact sheets and other written materials, (2) news releases to the local newspaper, (3) public meetings, (4) display ads announcing the availability of key documents and meetings, (5) public comment periods, and (6) responsiveness summaries for Records of Decision.

Copies of all site-specific documents used in developing the interim-action decision were made available to the public through the Administrative Record for the site housed at the Monticello City Offices. Copies of the Proposed Plan (DOE 1998b) for an interim remedial action at OU III were included in the site Administrative Record and distributed to stakeholders. The notices of availability for these documents were published in the local Monticello newspaper. A public comment period on the interim remedial action was held from March 27 to April 27, 1998, and a public meeting was held on April 7, 1998. At this meeting, representatives from DOE, the Environmental Protection Agency, and the State of Utah answered questions about the site and the selected remedy. A summary of the meeting and public comments received at that meeting and during the public comment period are presented in this appendix for inclusion in the Administrative Record. The decision for an interim remedial action at this site is based on information in the Administrative Record.

Summary of Public Comments and Agency Responses

I. Comments received at the Public Meeting

(1) One community member asked if the contaminated ground water could be pumped into

Montezuma Creek to dilute it instead of treating it.

DOE Response: This isn't possible because State laws don't allow it.

(2) One community member asked what process would be used to treat the ground water.

DOE Response: Ground water will be treated with a combination of chemical reaction and filtration (both micro filtration and reverse osmosis).

(3) One community member perceived the levels of contaminants in the ground water to be so low that the need for treatment was questioned.

DOE Response: The contamination, though measured in small amounts, would be harmful if someone were to drink it for their main source of water for their lifetime. CERCLA requires that both current and potential future uses be considered.

(4) One community member suggested pumping out contaminated ground water and using it as dust control in the repository. The community member noted that when the tailings source removal was complete, then the whole site would be cleaned up.

DOE Response: Contaminated ground water is being used as dust control in the repository, but it is predicted that areas of ground-water contamination will remain after Millsite cleanup.

(5) One community member asked what the ground-water flow rates were at the site.

DOE Response: The amount of water moving past the eastern boundary of the Millsite is 40 to 50 gallons per minute.

(6) One community member asked if the creek water was dangerous to animals.

DOE Response: The ecological risk assessment concluded that there is no significant risk to animals from drinking the water.

(7) One community member commented that the original study claimed that there would be 2 cancer deaths in 100,000 people after 70 years. The commenter noted that Monticello has less than 2,000 people, so there should be no effect on its population.

DOE Response: This was a statement; no response was given.

II. Informal comments and other community involvement activities

(1) The week following DOE's public meeting on April 15, 1998, the Site-Specific Advisory Board for the MMTS met. Members of the board unanimously supported the preferred interim remedial action alternative as presented by DOE the previous week.

III. Written comments and responses

None were received.

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